International Edition

June 1984 Issue #285
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73 T.M.

Amateur Radio's Technical Journal

A CWC/I Publication

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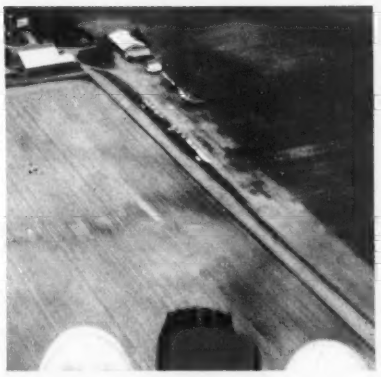

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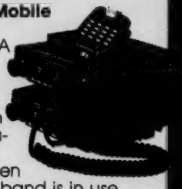

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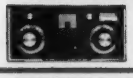

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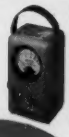

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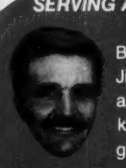

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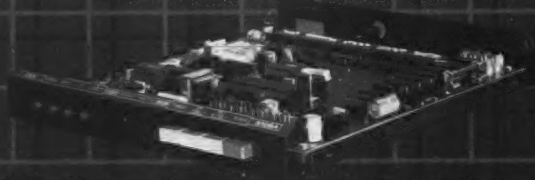

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For the ultimate in two-meter communications, ICOM presents the IC-271H transceiver with a high dynamic range receiver and a 100 watt transmitter. Operating from the IC-PS30, IC-PS15, or the internal IC-PS35 (optional), the IC-271H brings all the advanced functions of the latest CPU controlled radios to your shack.

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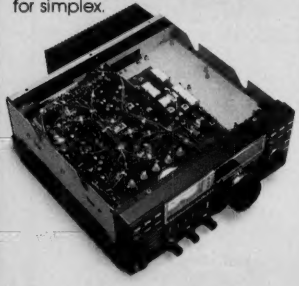

IC-PS30
Power Supply

Subaudible Tones. Included as a standard feature are 32 built-in subaudible tones which are easily selected by rotating the main tuning knob. PL tones may be stored into memory.

32 Full-Function Memories. Each tunable memory holds frequency, offset, offset direction, mode and subaudible tone. Each parameter is selected by rotating the main tuning knob in conjunction with the switches on the front panel.

PLL Locked at 10Hz. An extremely low-noise, professional receiver and a good signal-to-noise ratio PLL allows the IC-271H's synthesizer to lock to 10Hz providing receiver performance unparalleled by any other VHF receiver.

Fluorescent Display. ICOM's high-visibility, multicolor display gives easy-to-read display of all information necessary for logging a contact. Frequency, mode, duplex, offset direction, RIT frequency, memory channel and PL tone can be displayed.

Scanning. The IC-271H can scan memories and programmed sections of the band or modes. Mode-S scan can be used to scan only memories with a particular mode or lock out frequencies continuously busy so the receiver will not stop at that memory channel while scanning.

Other Standard Features. To facilitate the operation of the IC-271H, ICOM has incorporated a duplex check switch, all-mode squelch, receive audio tone control, S-meter, center meter, seven-year lithium battery memory backup, accessory connector and microphone.

Optional Features. IC-271H options are: switchable preamplifier, CTCSS encoder/decoder (encoder is standard), computer interface and voice synthesizer.

Size. Only 11¼ inches wide by 4⅜ inches high, the IC-271H is styled to look good and engineered for ease of operation.

IC-271H
Shown with internal power supply, IC-PS35

The IC-271A. The IC-271A with 25 watt output is available and has the same features as the IC-271H, plus an optional IC-PS25 internal power supply to make it a compact, go-anywhere two-meter base station. See the IC-271A(H) and other fine ICOM equipment at your ICOM dealer today.

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W2NSD/1
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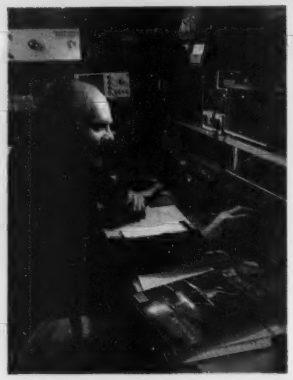
editorial by Wayne Green



DUMB WAYNE

Word of a petition I submitted to the FCC having to do with CW was published in abbreviated form in *QST*. Working on the basis of this biased report and without giving the situation much thought, a few Chicken Littles have been yelling wolf, if I may mix my metaphors. Actually, I think that without exception the reaction has been to attack me personally, not my ideas. I'm used to that.

In a classic case of projection, I'm classed as dumb by amateurs who haven't been reading *73* and thus don't understand what I'm doing. Hey, they may not agree with what I think or do, but if they ascribe dumbness as a factor, they're in trouble.

So what in hell is Wayne up to, anyway? Well, it is simple in some ways, but not quite obvious unless you read things carefully all the way through and then think about it. You *73* readers are used to that—indeed, that may be one of the things that sets you apart from the others.

Let's look at the basic situation. We have a dying hobby—amateur radio. Twenty years ago, 75% of the newcomers were teenagers. Now, not only do we have very few newcomers, but of the ones we do have, only about 25% are teenagers. Thus not only is amateur radio drying up as a market and as a hobby, but also it has almost totally dried up as a source of high-tech career people. This last has, I believe, done serious damage to our country.

Now, I suppose that it is quaint of me to worry about the United States. And it is even sillier for me to let my feelings for my country influence what I do. But I see amateur radio as having two major responsibilities to our country—one as a way to attract youngsters to high-tech careers and the other as the only real backup we have for communications in case of a nuclear attack.

Neither of these is a simple matter. But I can't help but take emergency communications seriously when President Reagan tells us that a survivable emergency communications service would be one of the best deterrents to an atomic attack yet. This makes eminent sense.

If I didn't think it made sense, I would not have devoted the last few years to working with the FCC's National Industry Advisory Committee and the last 18 months also to the FCC's Long-Range Planning Committee (for emergency communications). I've made many trips to Washington at my expense for these committee meetings and have been one of the more active participants right from the beginning.

By virtue of my position with the committees and my discussions with the FCC Commissioners, I have a fairly good understanding of the state of the art of emergency communications at present for all of the communications services. I've written about this before, so it should not be a news flash. I don't think I'm letting any secrets out if I tell you that other than amateur radio, there are few real plans for coping with any serious emergencies by the commercial radio communications systems. The worst part of it is that you may imagine that amateurs have some sort of wonderful secret plan. Sorry about that, but there's virtually nothing!

Amateurs have taken the lead in coping with emergency communications needs for many years—and we've done rather well, all things considered. These past emergencies have taught us some lessons which

Continued on page 88

QSL OF THE MONTH

To enter your QSL, put it in an envelope along with your choice of a book from *73*'s Radio Bookshop and mail it to *73*, Pine Street, Peterborough NH 03458, Attn: QSL of the Month. Entries not in envelopes or without a book choice will not be accepted.

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With 45 big watts, the TR-7950 is the most powerful 2 meter FM rig you can buy. The TR-7930 with a modest 25 watts is also available. A HI/LOW power switch allows power reduction to approx. 5 watts.

Other key features include: Programmable band-scan width, Center stop during band-scan, with indicator. Scan stops on busy channel and resume scan is automatic (time 5 sec. adjustable) or carrier operated. A scan delay of approx. 1.5 sec. is built-in. Scanning can also be accomplished with UP/DOWN microphone or "SC" key on front panel. Programmable priority alert can be set into any of 21 memory channels. With Alert switch "ON," a dual "beep" sounds when signal is present. The microprocessor is pre-programmed for simplex or ±600 kHz offset in accordance with the 2 meter band plan, with an "OS" key to allow manual changes in offset. The keypad functions as a 16-key autopatch encoder during transmit. Frequency coverage is 142.000-148.995 MHz, and it has a repeater reverse switch and mobile mounting bracket. All these features are available in one compact, lightweight rig.

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TR-7950 optional accessories:

TU-79, three frequency tone unit, KPS-12 fixed-station power supply (7950), KPS-7A fixed-station power supply (7930), SP-40 mobile speaker, SP-50 mobile speaker, MC-55 mobile microphone with time-out timer, MC-46 16-key autopatch UP/DOWN mic, SW-100A/B power meters, PG-3A noise filter.

More information on the TR-7950/7930 is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, CA 90220.

Specifications and prices are subject to change without notice or obligation.

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pacesetter in amateur radio

Scan the World.
R-2000

Kenwood's R-2000 receiver has opened the doors to a new world in the 150-kHz to 30-MHz HF bands, with microprocessor controlled operating features and an UP conversion PLL circuit for maximum flexibility and to enhance the excitement of listening to stations from east to west, and from pole to pole. An optional VC-10 VHF converter, for 118 to 174-MHz, allows access to police, aviation, marine, commercial, and two meter Amateur frequencies. With dual digital VFO's, ten memories that store frequency, band and mode information, memory scan, programmable band scan, fluorescent tube digital display, and dual 24-hour clock with timer, this outstanding radio has the versatility needed to reach out and catch those distant and elusive stations in the most remote areas of the world.

The R-2000 receives in the USB, LSB, CW, AM, and FM modes, and its ten memories allow moving from band to band without concern for mode of operation. The programmable band scan feature permits scanning over operator selected limits, reducing scan cycle time. Memory scan allows the operator to scan all, or only specific memories. Lithium battery memory backup (Estimated 5 year life) is built-in.

With the sensitive R-2000, only the best in selectivity will do. It has three built-in IF filters, with NARROW/WIDE selector switch, and an optional 500-Hz narrow CW filter is available. A noise blanker, and an all-mode squelch circuit further enhance the operators control of his listening environment. An AGC switch, and an RF attenuator switch allow selection of the best signal-to-noise ratio. It has a large, front mounted speaker, a tone control, an "S" meter, high and low impedance antenna terminals, and operates on 100/120/220/240 VAC, or on 13.8 VDC, with an optional DCK-1 DC cable kit. Other features include a record output jack, an audible "beeper," a carrying handle, a headphone jack, and an external speaker jack.

The R-2000 places the world at your finger tips.

R-2000 optional accessories:
VC-10 VHF converter • HS-4, HS-5, and HS-6 headphones • DCK-1 DC cable kit • YG-455C 500-Hz CW filter.

R-1000 High performance receiver • 200 kHz–30 MHz • digital display/clock/timer • 3 IF filters • PLL UP conversion • noise blanker • RF step attenuator • 120-240 VAC (Optional 13.8 VDC).

R-600 General coverage receiver • 150 kHz–30 MHz • digital display • 2 IF filters • PLL UP conversion • noise blanker • RF attenuator • front speaker • 100-240 VAC (Optional 13.8 VDC).

More information on these products is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

Specifications and prices are subject to change without notice or obligation.

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TS-430S

Digital DX-terity... that outstanding attribute built into every KENWOOD TS-430S that lets you QSY from band to band, frequency to frequency, and from mode to mode with the speed and ease that will give you a dominant position in DX operations.

KENWOOD'S TS-430S, a revolutionary, ultra-compact, HF transceiver has already won the hearts of radio Amateurs the world over. It covers 160-10 meters, including the new WARC bands (easily modified for HF MARS). Its high dynamic range receiver tunes from 150 kHz-30 MHz. It utilizes an innovative UP conversion PLL circuit for superior frequency stability and accuracy. Two digital VFO's allow fast split-frequency operations. A choice of USB, LSB, CW, or AM, with FM optional, are at the operators fingertips. All Solid-state technology permits inputs of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.

Eight memories store frequency, mode, and band data, with Lithium battery memory back-up. Memory scan and programmable automatic band scan help speed up operations. An IF shift circuit, a tuneable notch filter, and a Narrow-Wide switch for IF filter selection help eliminate QRM. It has a built-in speech processor. A fluorescent tube digital display makes tuning easy and fast. An all-mode squelch circuit, a noise blanker, and an RF attenuator control help clean up the signal. And there's a VOX circuit, plus semi-break-in, with side-tone. All-in-all, it just could be that the expression "Digital DX-terity" is a bit of an understatement.

TS-430S Optional Accessories: In typical KENWOOD fashion, there are plenty of optional accessories for this great HF transceiver. There is a special power supply, the PS-430. An external speaker, the SP-430, is also available. And the MB-430 mounting bracket is available for mobile operation. The AT-250 automatic antenna tuner was designed primarily with the TS-430S in mind, and for those who prefer to "roll their own," the AT-130 antenna tuner is available. The FM-430 FM unit is available for FM operations. The YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters, the YK-88SN SSB filter, and the YK-88A AM filter may be easily installed for serious DX-ing. An MC-60A deluxe desk microphone, MC-80 and MC-85 communications microphones, an MC-42S mobile hand mic., and an MC-55 8-pin mobile microphone, are available, depending on your requirements. TL-922A linear amplifier (not for CW QSK), SM-220 station monitor, PC-1A phone patch, SW-2000 SWR/power meter 160 ~ 6 meter, SW100A SWR/power/volt meter 160-2m, HS-4, HS-5, HS-6, HS-7 headphones, are also available.

More information on the TS-430S is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

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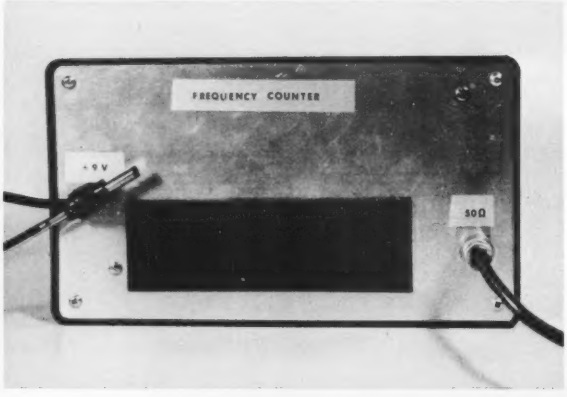
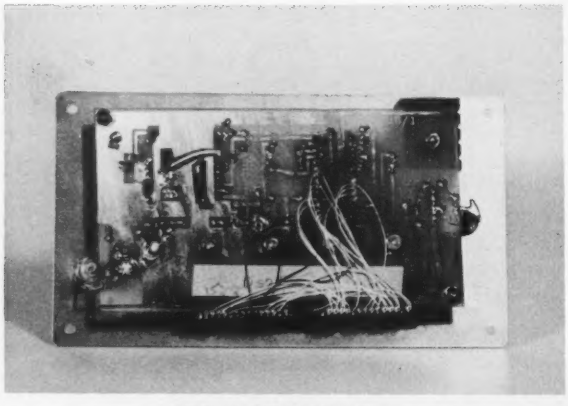
Easy Berardi Building

You can count on this simple frequency counter from Arizona.

Joseph Berardi
14213 N. 38th St.
Phoenix AZ 85032



Front view.



PC board, foil-side view.

This is a construction article for building a very simple, high-quality frequency counter. My home-made counter uses the very popular Intersil ICM-7216-D counter chip and the Fairchild 11C90 prescaler. Just add a few discrete components, some LED displays, another three ICs and we have a very professional-looking frequency counter. I built this counter on a 3"×6" printed circuit board and installed it in a small lightweight enclosure. The counter design is essentially lifted right out of the appli-

W1	U1-3 to DS2-9
W2	U1-4 to DS2-7
W3	U1-5 to DS2-8
W4	U1-6 to DS2-6
W5	U1-8 to DS1-9
W6	U1-9 to DS1-8
W7	U1-10 to DS1-7
W8	U1-11 to DS1-6
W9	U1-15 to DS1-1
W10	DS1-1 to DS2-1
W11	U1-16 to DS1-14
W12	DS1-14 to DS2-14
W13	U1-17 to DS1-13
W14	DS1-13 to DS2-13
W15	U1-19 to DS1-3
W16	DS1-3 to DS2-3
W17	U1-20 to DS1-11
W18	DS1-11 to DS2-11
W19	U1-21 to DS1-4
W20	DS1-4 to DS2-4
W21	U1-22 to DS1-12
W22	DS1-12 to DS2-12
W23	U1-23 to DS1-5
W24	DS1-5 to DS2-5

Table 1. Wiring guide.

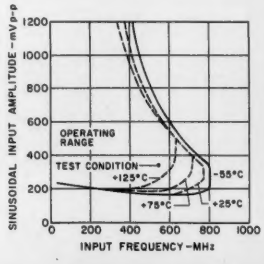
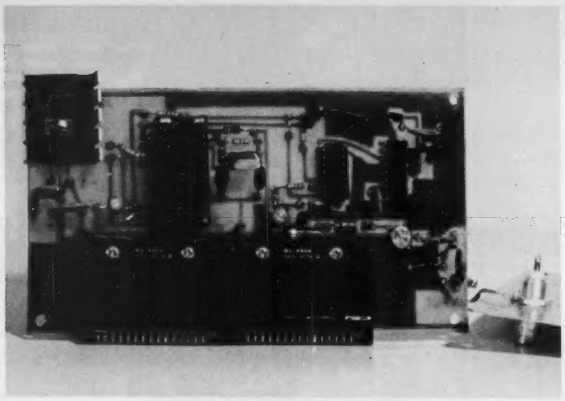


Fig. 1. Operating range of the 11C90.

Frequency (MHz)	Signal Level (mV rms) Minimum	Maximum
.449	10	1,800
1.0	10	2,250
10.0	10	2,250
50.0	14	600
100.0	20	2,000
150.0	20	540
200.0	27	540
250.0	31.5	380
300.0	37	760
350.0	31.5	470
400.0	31	340
450.0	47	280
500.0	50	270
550.0	71	280

Resolution 1 kHz @ .1-second gate time; power requirements: 5 volts @ 200 mA or 7.5–24 volts @ 225 mA.

Table 2. Operating limits on the author's counter using an HP8640 for comparison.



PC board, component-side view.

cation notes for both the frequency counter and prescaler ICs.

I will not go into great detail on the operation of the two main ICs; the application notes have all of the necessary information. This counter will accurately measure frequencies from 500 kHz to over 600 MHz.

Operation

The frequency counter circuitry consists of three main sections. The first section consists of a wideband commercial-grade amplifier. The second section consists of two counters to prescale the signal down to a usable frequency since the Intersil maximum operating frequency is about 10 MHz. The third section is the Intersil counter which counts pulses for a specified gate time and then displays the frequency.

Preamplifier

The wideband amplifier has a flat frequency response up to 450 MHz and gradually starts rolling off as the frequency increases. The MWA130 has a gain of approximately 14 dB from 0 to 450 MHz and gradually drops down to 11 dB of gain at 600 MHz.

The high-power amplifier was chosen over the low-power version (MWA110) since the amplifier starts saturating at a much smaller signal level. When the amplifier starts saturating, the harmonics increase in amplitude relative to the fundamental. This confused the prescaler and resulted in erroneous readings. According to the data sheet, the prescaler is most sensitive with a 225–400-mV p-p signal applied to the input. The diodes on the input merely protect the amplifier since the diodes won't start limiting until a 500-mV p-p signal is applied. This signal level would result in presenting a minimum of 1-V p-p signal to the prescaler. This would limit the prescaler to only 450 MHz.

Prescaler

The 11C90 is a high-speed prescaler designed for communication and instrumentation applications. The prescaler can be programmed to divide by 10 or 11. The 11C90 is hard-wired in the divide-by-10 mode. The prescaler has both ECL and TTL outputs, but only the TTL output is used in this ap-

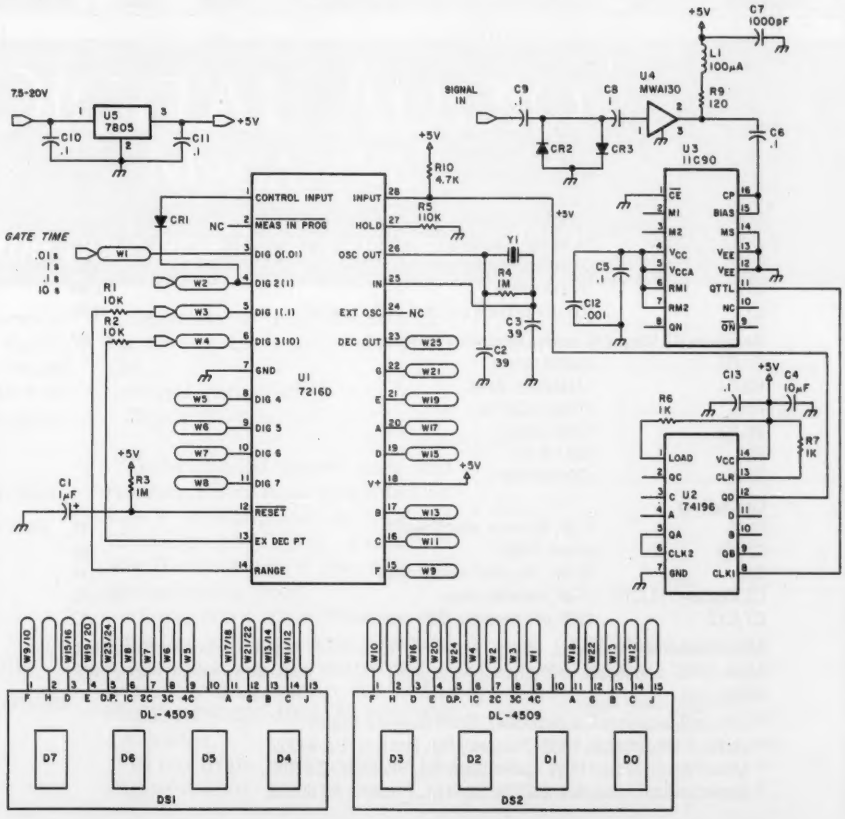


Fig. 2. Frequency counter schematic.

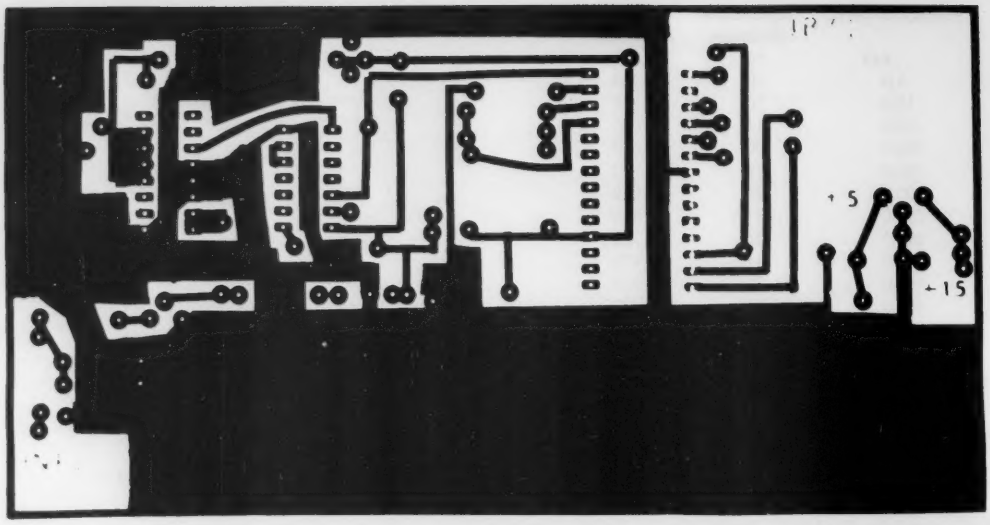


Fig. 3. PC board.

plication. According to the data sheet, this IC has the widest operating range, with a 225–400-mV p-p input signal level (see Fig. 1).

The prescaled output toggles a TTL decade counter; the output of the decade counter is now 1/100 of the original signal and is counted by the Intersil frequency counter.

Frequency Counter

The frequency counter has an internal time-base oscillator which uses an external crystal. A 10,000-MHz crystal was chosen for this application. There are a few discrete external components which tap the signals necessary for determining the counter's mode of operation. The counter has four possible gate times, but only the .1-second gate time is used, for simplicity. A 1-second gate time will increase the counter's resolution to 100 Hz, but will update the display at a much slower rate—which can be annoying if you are looking for rapid changes in frequency.

Parts List

U1	ICM7216D—Intersil (common cathode)[1,2]	$20.95
U2	74196	.80
U3	11C90—Fairchild [1,4]	16.95
U4	MWA130—Motorola [1,3,4]	8.25
U5	LM7805	.99
DS1	DL-4509—Litronix (common cathode)[2,4]	2.99
DS2	DL-4509—Litronix	2.99
Y1	10.0-MHz crystal	3.00
CR1–3	1N914 diode	10/.99
L1	100-uH–500-uH molded coil, ¼ Watt	1.35
Resistors (¼ Watt, 5% unless otherwise specified)		.07
R1,R2	10,000 Ohms	
R3,R4	1,000,000 Ohms	
R5	110,000 Ohms	
R6,R7,	1,000 Ohms	
R9	120 Ohms	
R10	4700 Ohms	
Capacitors		
C1	1 uF, 50 volts, electrolytic	.15
C2,C3	39 pF, mica	.28
C4	10 uF, 50 volts, electrolytic	.15
C5,C6,C8–C11,C13	.1 uF, ceramic disc	10/1.25
C7,C12	1000 pF, ceramic disc or mylar™	.12

Miscellaneous: PC board, 28-pin, wire-wrap IC socket, 14-pin low-profile IC socket, case, BNC connector, miniature phone jack, TO-220 heat sink, 8-digit bezel, wire, solder, etc.

[1] Circuit Specialists Co., Box 3047, Scottsdale AZ 85257.
[2] Jameco Electronics, 1355 Shoreway Rd., Belmont CA 94002.
[3] MHz Electronics, 2111 W. Camelback Rd., Phoenix AZ 85015.
[4] Semiconductor Surplus, 2822 N. 32nd St., Phoenix AZ 85008.

Construction

I laid out a printed circuit board for the circuitry and used the wire-wrap technique for wiring the displays. The point-to-point wiring method will work just as well for the displays. A wire list is included for wiring the two Litronix red multi-digit reflector arrays. These displays are very inexpensive, but almost any common-cathode, seven-segment displays can be used instead. The prescaler must be soldered directly onto the PC board, but DIP sockets can be used for the remaining DIP ICs. The builder should use the assembly drawing as a guide for installing the parts, and the parts list for determining the component values.

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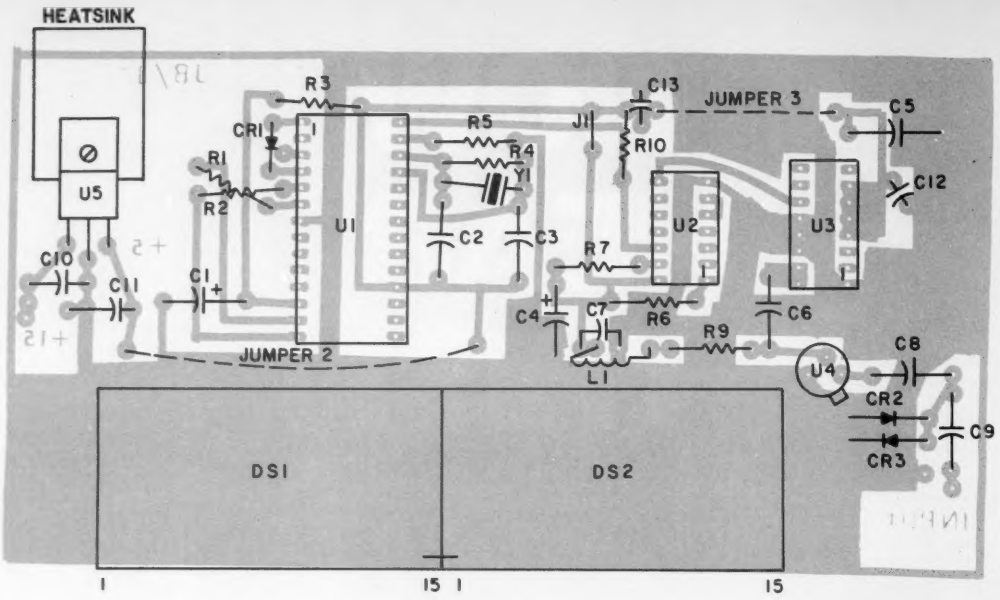

Fig. 4. Component layout.

Checkout

This project requires a +5-V-dc supply. A voltage regulator is supplied, so a dc charger (Radio Shack) can be used for power. When using the voltage regulator, the supply voltage can be anywhere between 7.5 and 20 volts but must be able to supply 200 mA of current. The display will light up as soon as power is supplied. Apply a signal to the input and the display will count the input frequency. You will be surprised at the excellent performance of the counter. ■

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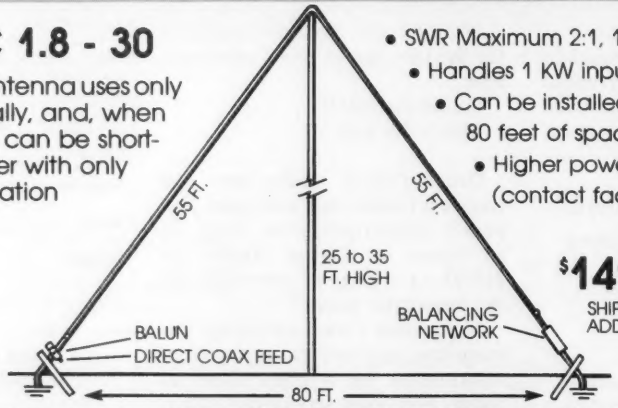

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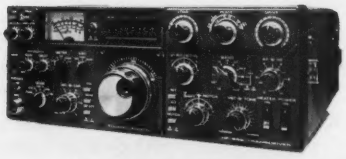

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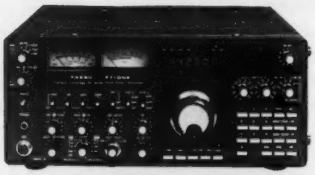

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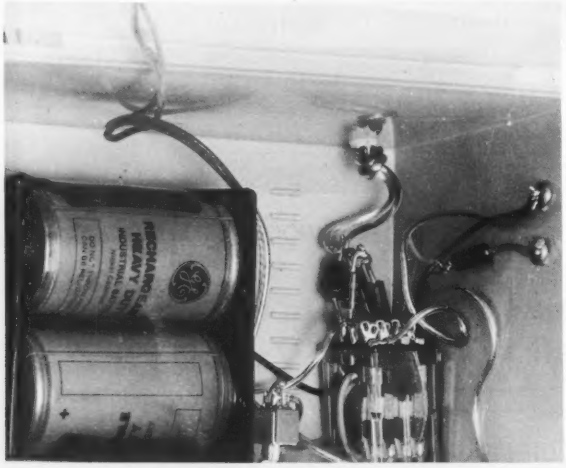
Because a salesman's business lunch was abruptly interrupted by a sudden power failure, a well-known flashlight and battery manufacturing firm was founded. When the main lighting system failed, everyone's attention was drawn to the restaurant's novel flower planters; they contained a crude flashlight. Perhaps this is one of the earliest recorded uses of automatic emergency lighting.

Today, it is common, even required in some cases, to have a form of automatic emergency lighting in hospitals, hotels, businesses, etc. Many homes are so equipped as a matter of convenience.

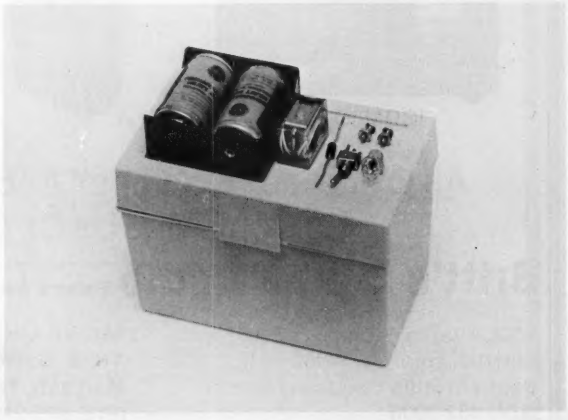
Although sophisticated commercial systems are available which include rechargeable batteries, trickle chargers, test buttons, and power-on indicators, it is practical to make a simple but very effective system mostly out of junk-box parts. The system need not be any more complicated than a flashlight lamp, two dry cells, a relay, and a snap-in battery holder. Two alkaline cells, if the TV ads are believable, should still give plenty of light even after two years of intermittent use, although an annual check/change might be in order.

Regardless of which system you put into your home, ham shack, or cabin, the basic operation is quite simple. When the power fails, the normally-closed contacts of a 115-volt relay complete the circuit between the batteries and light bulb. The bulb automatically turns off and the batteries start recharging (if it is that type of system) when the power is restored.

Gel cells take a float charge quite well, and for that reason are found in many commercial emergen-



Parts placement. The four diodes at the relay form a bridge, allowing use of a 6-volt relay and a cheap ac low-voltage game module. The diode near the top of the box ensures proper polarity of the recharging current.



The parts needed for the project.

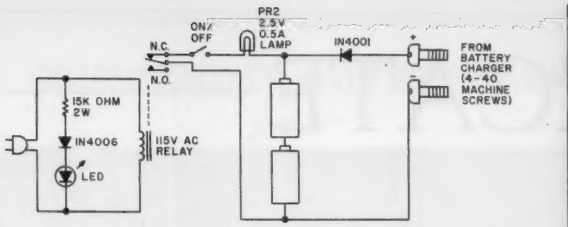


Fig. 1. Schematic of the emergency-lighting project.

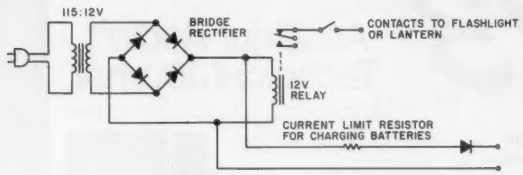
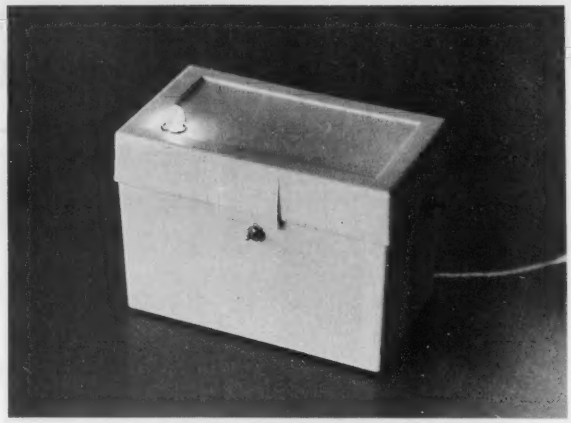


Fig. 2. A variation of the project.



The finished project in action.

cy-lighting systems. Nicads, on the other hand, don't like float charging and should be completely run down before being recharged.

A 4" × 6" card-file box holds the few parts I used. The on/off switch disables the system when it is purposely removed from the power mains. The terminals on the side of the box go to an external charger for the two nicads. As the diagram in Fig. 1 shows, a diode is series-connected with one of the terminals to prevent accidental discharge or reverse charge. The relay contacts could be connected to a lantern through a miniature plug and a closed-circuit jack if you don't wish to construct a flashlight. The relay isolates the 115-volt lines from the low-voltage lighting circuit.

Fig. 2 shows a variation using a low-voltage relay with suitable transformer and provisions for recharging batteries. Don't give up for lack of a 115-volt relay. Perhaps the spare-parts box has an old door bell transformer and a low-voltage relay in it, or a diode and a series-voltage-dropping resistor can make a dc relay work.

There are many possible variations of the basic circuit; this should give you a good starting point.

The gentle pitter-pat of a summer rain shower and accompanying sharp lightning bolt doesn't have to leave you in the dark again! ■

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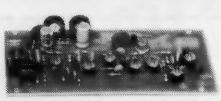

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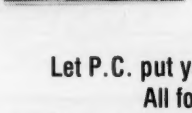

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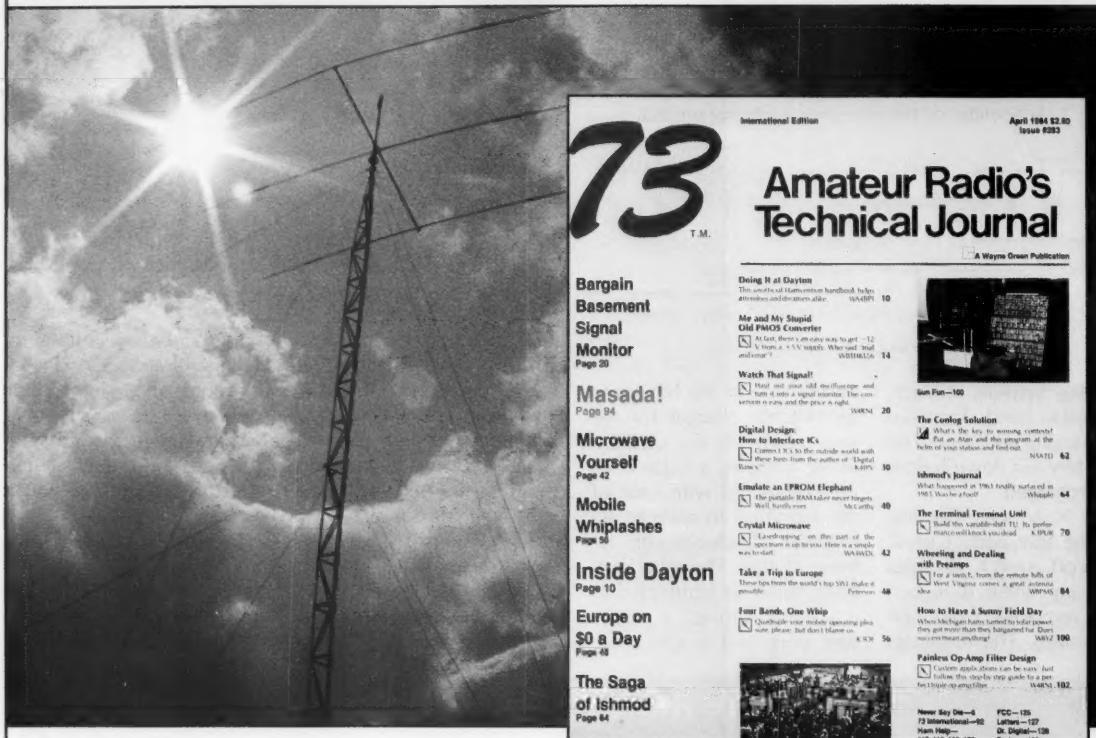

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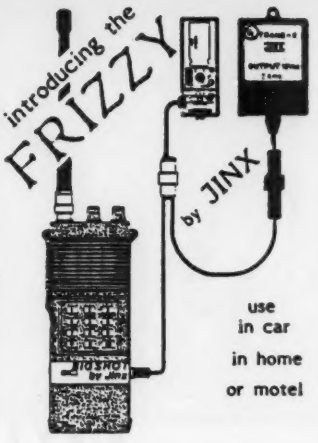

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Flying High with Two

Here's how a hand-held makes for some ultralight Michigan madness.

Ralph E. Taggart WB8DQT
602 S. Jefferson
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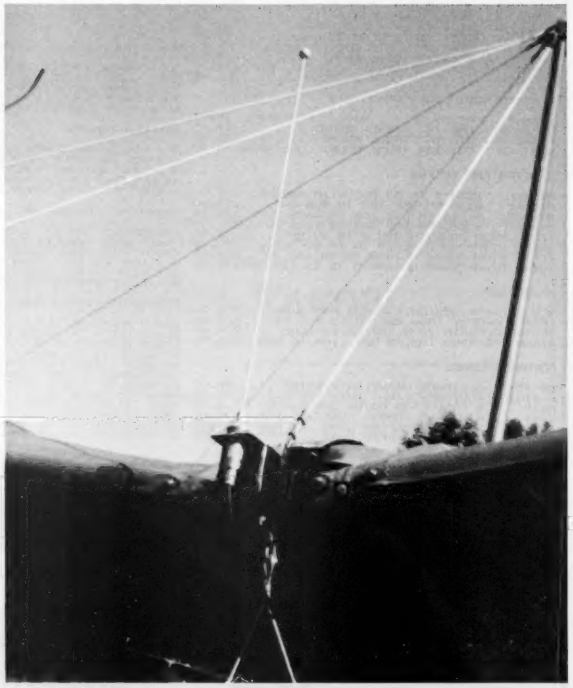
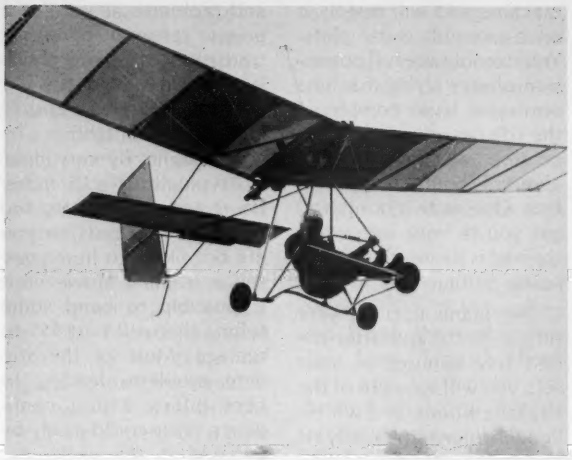
FM articles in the amateur press seem to cover a wide spectrum—from providing communications for the opening of a new

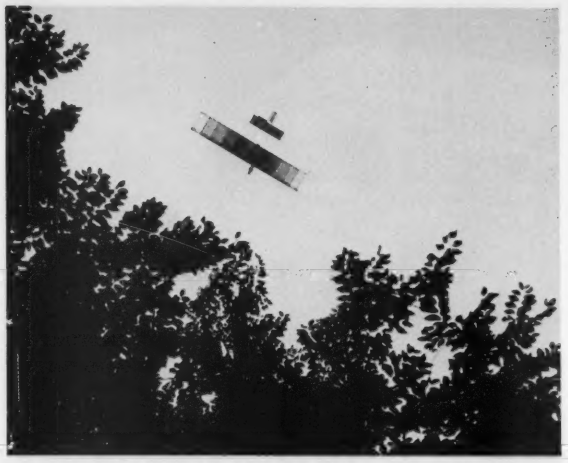
The author intently strapping into the flying harness prior to donning stopwatch, camera, and hand-held. Some of the wire bracing that rigidifies the aircraft structure is clearly visible. The 15-hp engine is mounted below the wing and drives the prop (located behind the wing) through a belt reduction system.



A 2-meter quarter-wave whip anchored to the forward end of the fuselage provides increased range over a rubber duckie partially shielded by the tubular frame of the aircraft.



Don Chubb, my partner in ultralight madness, lifts off in light ground fog for an early morning flight. The pilot's weight is shifted to the rear for takeoff and climb, achieved by simply keeping his legs straight when his feet are resting on the foot bar up by the nose wheel. Movement forward will pitch the nose down while movements from side to side will turn the aircraft in the direction of movement. Pitch control is achieved entirely by weight shift. The side to side movements of the pilot induce the required bank for a turn with the rudder coupled to the harness. Although such a control system sounds strange to a pilot used to the conventional control stick and rudder pedals, it actually feels quite natural and can be learned in a fraction of the time required for conventional flight training.



After taking off and making a 180° turn, the author swings back over the farmyard while climbing to cruise altitude. Although our Quicksilver *has a service ceiling of 9000 feet, most flying is done between 500 and 1500 feet—high enough for safety yet low enough to avoid most other air traffic while still maintaining a good view of the countryside. Wind is the greatest enemy of the ultralight flier and most flying is done with wind speeds of 5 mph and below —primarily early morning and early evening. I have built a couple of fancy anemometers to keep track of wind speed, but the leaves of this old tree still provide the most reliable indication of flying conditions.*

sewage plant to linking voice-controlled repeaters with blue light. In a sense this is an FM article, but it is a bit off the beaten track in that it describes a new use for those ever-present two-meter hand-helds that seem to be sprouting up like mushrooms on the ad pages of all the magazines.

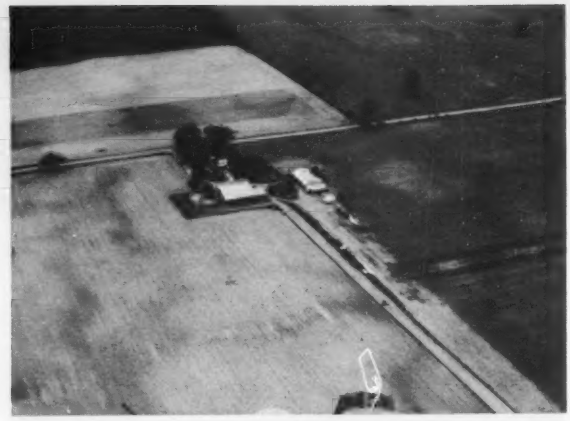
The subject at hand is the marriage of good old VHF and UHF FM with what is perhaps the neatest invention since 20 meters—the ultralight aircraft. It is an application where your FM bands may provide one of the few viable options for good communications (more on that later), but for the moment, if you have a slightly adventurous spirit, hang in there and let me introduce you to ultralights prior to lamenting their communications problem.

First of all, what is an ultralight? The easiest answer is that it is a minimal aircraft—a simple flying machine of aluminum tubing, dacron™, and a small engine—that can introduce you to the thrill of flying with a minimum of fuss, low cost, and, although it might seem difficult to believe, safety. Almost everyone has dreamed of flying at one time or another and radio amateurs are at least as prone to the syndrome as anyone else—perhaps more so. The next time an air mobile calls on 52, just listen to the pileup! The response is due in no small part to the vicarious participation it provides.

In the days of the Wrights and pioneers such as Glen Curtis, the aircraft were constructed of wood, fabric, and wire, and although the activity was far from safe, it was thrilling enough to galvanize a world into the age of flight. Today flying is taken for granted—the thrill is still there and it is certainly safe, but just as certainly it is no longer either simple or economical. Of course it really can't be simple with air lanes criss-crossing the sky stacked all the way to the stratosphere and the requirement of maintaining the safety of those in the air and on the ground. Nonetheless, it is hard to avoid nostalgia for the early days when frail aircraft lifted out of cow pastures, thrilling pilot and spectators alike.

In a sense, ultralight aircraft can provide a return to the best of these rose-colored visions. Ultralights trace their evolution to the hang-gliding movements of the early and middle 60s when intrepid souls, longing to fly on a budget, launched down hills and sand dunes on (or more precisely beneath) rogallos, monoplanes, and biplanes constructed of bamboo and plastic sheeting. That sport blossomed with the aircraft rapidly evolving to sophisticated aerodynamic forms constructed of aircraft aluminum and dacron. Today the sport is dominated by launches from cliffs and mountains in search of the lift to provide flights to extreme altitude or long distances cross-country. Internal regulation permitted hang gliding to develop into a generally sane activity and I have followed its development for several years.

Unfortunately, Michigan has no mountains and even if we had spectacular cliffs and sea breezes, I really couldn't see myself stepping off into the void! Apparently other flatlanders had the same problems, but their response was different. Instead of sighing and putting away the magazines, they responded by attaching engines and wheels to reliable hang-glider designs and ultralights were born! The result has been a



Our rural "aerodrome" photographed from an altitude of 400–500 feet. Not a bad antenna location. Although the gain of the array may not be spectacular, it's hard to complain about the line losses. The reliable communications range is quite fantastic and if the link is marginal, you simply climb a little higher.

surge of reliable, simple aircraft that will fly out of your local pasture. Aircraft-grade aluminum tubing and hardware, stabilized dacron, and light and powerful two-cycle engines replace the hardware of yesteryear while sophisticated application of low-speed aerodynamic principles replaces the "wonder if this will fly" approach of the early days. The simplicity and thrill remain.

At present, regulation is minimal (no pilot certificate or aircraft registration required) if the design meets two criteria—it must carry only one person and it must be *capable* of being launched and landed on foot. Note that I said capable. If the ultralight is a commercial product, the manufacturer will provide evidence of foot-launch and -landing capability and you can stick to your wheels. However, if you designed the bird or modified it and you should encounter an FAA inspector, expect to demonstrate it yourself. If you fail to do so, you will be advised to get a student pilot's certificate and register the aircraft. Stricter regulation is on the horizon, but it will probably be modest with an aim toward maintaining safety while preserving a category for simple recreational aircraft. Present limitations will probably be retained with the addition of standards for maximum aircraft weight, flight training standards, and assurance of familiarity with the Federal Aviation Regulations (FARs).

Ultralights come in a bewildering array of designs, most running between $3000 and $4500 in price. Most ultralights are delivered in the form of a collection of aircraft hardware, pre-drilled and -formed aluminum tubing, and pre-sewn fabric with assembly time varying from 10 to 30 hours.

The key to safety is to stick with those manufacturers who insist that you buy from a dealer who will inspect your work before you fly it. The *Quicksilver*, owned by my partner Don Chubb and me, is a good example of this policy. Manufactured by Eipper Formance of San Marcos CA, it must be purchased through a dealer who will provide any advice you require during assembly (about 20 hours). The dealer will withhold certain vital items—such as the prop—pending dealer inspection of your machine and will test-fly it once assembly is complete. You cannot take full possession of your flying machine until you have completed the dealer flight training course which involves about 5 hours of instruction. One or two hours will get you to your solo while the rest is devoted to developing proficiency.

The plane itself is very simple to fly and after the first few minutes of your solo you will ease out of the shaking-knees-and-white-knuckle phase and really relax and enjoy the experience. The key to safe ultralight flight is rigorous preflight checks on the machine and careful attention to the wind. The latter is an important factor given the light weight of the machine. Our *Quicksilver* has a 32-foot span and 160 square feet of wing area yet weighs only 155 pounds. With a pilot weight of 190 pounds, that is quite a bit of wing for relatively little weight. Most training is conducted under calm conditions. Air currents of 5–10 mph are considered windy and gusty conditions are avoided completely.

The thrill of flying cannot really be described. To really understand it, you have to experience the world opening up as you rise above the tree line at the start of your own private dawn patrol over the rural countryside. Suffice it to say that I spent a good bit of the summer flying every minute I could with nary a thought to the old radio shack!

Once I had become immersed in the ultralight experience, however, I did begin to realize that communications between the pilot and the ground could be of real value. Take training as one example. Needless to say, there is no such thing as dual instruction in a single-seat ultralight. The instructor stands on the sidelines to discuss your progress and problems as you learn proper ground handling, transition to crow hops (short hops into the air down the runway), and finally the solo flight.

Ultralights fly very slowly (typically 20–35 miles/hour) and are constructed of tough materials so you are not likely to hurt yourself in training. However, it is possible to bend some tubing that will cost $$$ to replace. Most of the student problems leading to bent tubing and a confidence crisis could easily be avoided if the instructor could speak to the student during his gyrations instead of afterward. Sounds like a job for radio. Ditto once you are flying regularly. Wind conditions can change, for example, while a flight is in progress. It would be nice if the individual waiting patiently (?) on the ground for his turn could talk with the flier about such weighty matters—not to mention the inevitable "You've been up for 40 minutes, the sun is going down, and I want my turn!"

Cross-country flights have their own attraction; although you will not go particularly far cruising at 30–35 mph, flights of up to 30 miles are quite practical. We usually run a chase car for such ventures, but the car has to follow the roads and is often detoured to pick up gas for the return flight or to get the family outdoors to watch Daddy fly over. Given these realities, a communications link would be quite useful in keeping track of where the aircraft is located, notifying if the flight route has been changed, or, heaven forbid, if you have had to put down somewhere out in the boonies with a problem.

Most ultralights are flown without instruments since they really aren't needed for this kind of flying. If you do carry up an altimeter or air-speed indica-

tor, it is usually out of a sense of curiosity rather than necessity. Radios, however, would be nice. The question is, what kind of a radio. It is here that the unique nature of ultralights presents a problem. Most are powered by two-cycle engines and the pilot environment is noisy, to put it very mildly. The noise is both acoustic and electrical. The former is taken care of by ear plugs designed to deaden impulse-type sound waves, but the electrical dimension is pure poison for an operating radio system. The electrical noise level varies with the engine in use but typically is moderate to quite high.

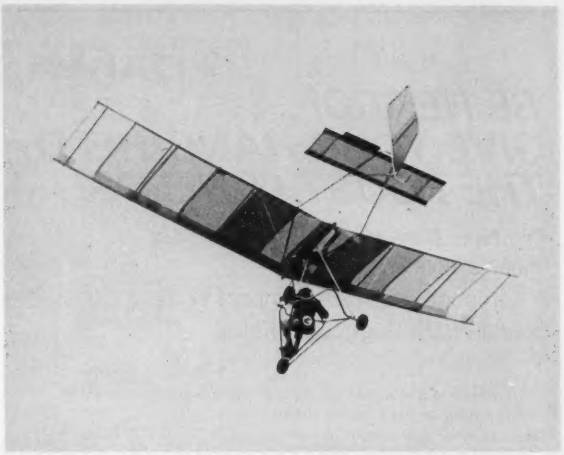
When an ultralight pilot or instructor first thinks about radios, the first step is usually a CB hand-held. Such units lack internal noise limiters and have poor squelch action and cumbersome antenna systems. The newer "rubber duckies" for 27 MHz have eased the size problem somewhat, but they are poor performers at such a low frequency. Even with a 5-Watt ground-based unit, the end result is a radio system that is so noisy and unreliable that it hardly pays to take it up!

Very compact transceivers (even synthesized hand-helds) are now available for aircraft service (108–136 MHz), but these are AM and have many of the same operational limitations as CB units. They also tend to be very expensive. But what about FM? FM would solve the electrical noise problem to a large extent and is characterized by effective squelch action as well. Since I already had a synthesized mobile rig for two meters, this was a logical place to start. Off to look at hand-helds!

I am definitely not a two-meter freak, so the rig for the plane did not have to be microprocessor-equipped—I was not, after all, going to figure my income tax while aloft. I started to scrounge for an old-fashioned crystal-controlled hand-held since these are now considered passé in the better FM circles. A close-out deal of a Pace Communicator MX, complete with rubber duckie, nicads, and charger, seemed the best bet, so off went a phone order to AES in Milwaukee and I had the unit a few days later. A quick check with the wattmeter indicated that my 1-Watt transceiver was putting out 700 mW in the high power mode and about 200 mW in low. What the heck, this did not seem to be an application requiring excessive power and the batteries would last longer. A camera strap was clipped to the securing ring on the hand-held; it went over my shoulder and I headed for the wild blue yonder.

The results of the first test were mixed. On the plus side it soon became obvious that even 200 mW was sufficient for solid communications to the ground mobile, with altitude more than compensating for the inefficiencies of that rubber excuse for an antenna. Although the noise of the engine was definitely modulating the downlink signal, the voice audio had no trouble riding over it with adequate intelligibility. Reception upstairs was another matter, however. Between the engine noise and the ear plugs, there was no way that that little speaker was going to be heard.

That evening was spent on the bench adding an earphone jack. The next morning, complete with an earphone, we had a working communications system. My partner was impressed enough by the tests that he is hitting the code tapes and books to join the party. Refinements now under way include a padded clamp-rack for the radio, a quarter-wave whip mounted above the wing, and a "radio helmet" with a pair of built-in padded phones and a boom mike. Included will be a remote PTT switch on the control bar to minimize the one-handed flying.



The author photographed during a landing approach. Landings are typically made at low throttle with pilot weight shifted well forward to keep the nose down and the airspeed up. Note the bent knees to achieve this attitude.

Although the system was put together for utility communications, it soon became obvious that it had great potential for recreational hamming. Take my word for it: If you give a call on 52 from 1500 feet, you will get answered. It's really fun when the crowd discovers what you are flying and starts preparing the commitment papers while you are still aloft. The crystal complement includes 52 for general hamming, an out of the way frequency for utility communications (never mind where), and a couple of wide-coverage repeaters for the day I have to set down in someone's back 40 and call in the cavalry.

Obviously, if you are an amateur interested in ultralights, you have the communications problem half licked. Although all tests to date have been on two, 50, 220, and 440 MHz would be equally useful although lower-band occupancy might reduce the recreational potential.

A real interesting feature is the potential for recruiting ultralight types to ham radio. Most tend to be highly interesting people and we certainly can't complain if we snag a few of those to swell our ranks. Most fliers would like reliable radio systems and amateur radio can provide just that with a little study. An instructor with a ham ticket need only equip students with a pocket scanner to be able to provide those much-needed instructions at panic time. The advantages are obvious and the canny amateur will work a deal exchanging code and theory tutoring for flight instruction.

One of the things that keeps our hobby healthy is the constant search for new modes as well as new applications for existing technology. There will certainly be lots of ultralight fliers out there—the industry delivered only a few thousand units in 1980, but '81 sales soared quite a ways past 10,000 and most people are still unaware of their existence. Who knows, air mobiles might become quite common. As for me, try 52 and please excuse the background noise—I only worry when it stops! ■

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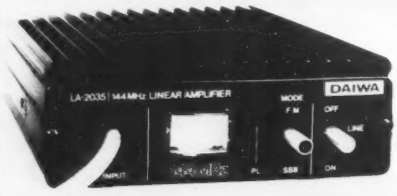

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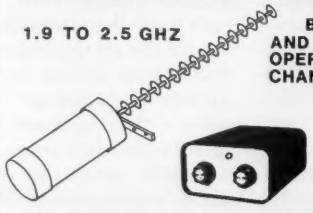

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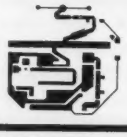

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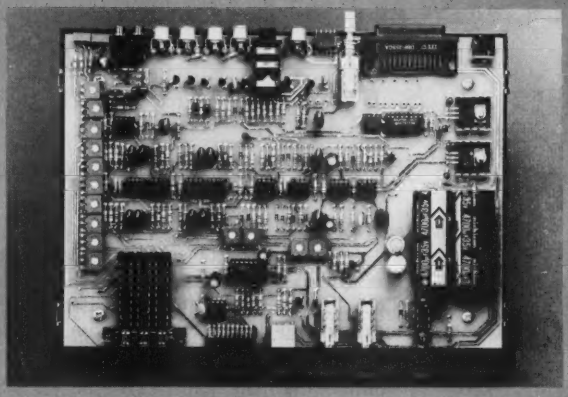

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One of the handier pieces of test equipment for someone who experiments with solid-state analog and digital equipment is a hand-held DVM. I recently needed such a device to measure dc and rf voltages. Since I had no need for either ac or Ohms scales, I chose to save a few dollars by building my own. A schematic of the result is shown in Fig. 1.

The heart of the DVM is an Intersil ICL7106 3-1/2-digit single-chip analog-to-digital converter (ADC) with on-board liquid-crystal-display (LCD) drivers. Powered by a 9-volt battery in the manufacturer's recommended circuit, it provides a basic 0.1999-volt full-scale DVM. Additional components expand the voltage measurement capability and drive the decimal points of the LCD.

The components which are grouped at the upper left of the 7106 (pins 27–29, 38–40) support internal functions: an oscillator, reference generator, auto-zero circuit, and integrator. The interested reader should consult a data sheet on the 7106 to learn more about its internal workings.

The components which are grouped at the lower left of the 7106 (pins 1, 26, 30–32, 35, and 36) provide power, a reference voltage, and the means to connect the voltage to be measured. Switched 9-volt power is applied between V+ and V−. The 22k fixed resistor and 1k trimpot which are connected from V+ to REF LO generate a reference voltage for the converter. The reference is stable because REF LO and COMMON are tied together, and COMMON is internally clamped at about 2.8 volts below V+. The voltage to be measured (0.1999 volts maximum) is applied between IN HI and IN LO (the latter and COMMON are tied together). A 1-megohm resistor limits the current which can flow in response to an overvoltage. Together, the 1-megohm resistor and a 0.01-uF capacitor form a simple low-pass filter. Taps on the 10-megohm resistive ladder between +IN and −IN provide 1.999-volt, 19.99-volt, and 199.9-volt ranges, selected by switch S1a.

With the exception of pin 37, the remaining pins on the 7106 drive the LCD directly. Unlike an LED display, an LCD must be driven by ac waveforms. A dc drive voltage will burn out an LCD in a matter of minutes. The 7106 applies a 60-Hz 5-volt peak-to-peak square wave to the backplane of the LCD. As long as the same waveform

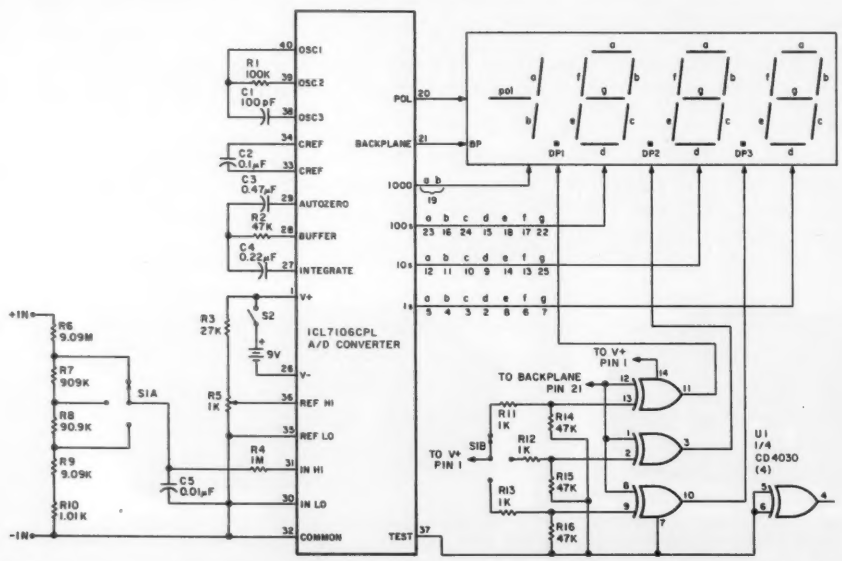

Fig. 1. Schematic of the DVM. LCD segment-driver pins on the 7106 are shown along with the designations of the segments which they drive. No pinouts are shown for the LCD, since they vary from device to device. Undesignated resistors are ¼-Watt, 5% tolerance. R5 is a 10%-tolerance trimmer. R6 through R10 are ¼-Watt, 1% tolerance. R6 is a 90.9k and nine 1M resistors in series. R10 is a 1k and a 10-Ohm resistor in series. Undesignated capacitors are mylar™. C1 is mica. All capacitors are 10% tolerance, 100-volt.

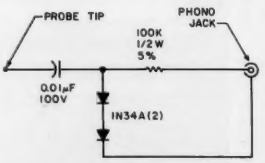

Fig. 2. Schematic of the rf probe.

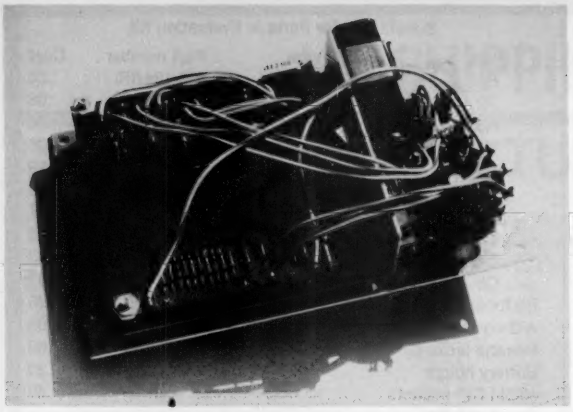

Photo A. Internal construction of the DVM.

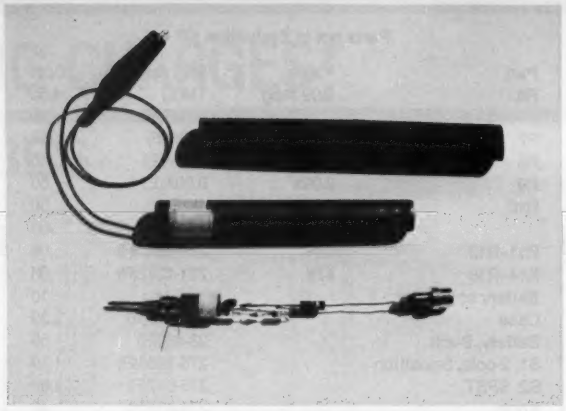

Photo B. Some construction details of the rf probe.

is applied to a segment of the LCD, that segment is off. A segment is on when the waveform applied to it is inverted with respect to the waveform applied to the backplane. The 7106 has internal drivers which accomplish the inversion for the minus sign and each segment of each of the four digits.

The circuit which consists of the CD4030 quad exclusive OR gate, S1b, and six resistors is needed in order to drive the decimal points. One input of each of the three active EOR gates is connected to the backplane drive signal. Depending upon the setting of S1b, the second inputs of two of the active EOR gates are pulled low by 47k resistors tied to ground (pin 37, TEST, is digital ground). These two gates pass the backplane drive signal unchanged, and the corresponding decimal points are off. The second input of the remaining active EOR gate is pulled high via S1b and a 1k resistor tied to V+. This gate inverts the backplane drive signal, and the corresponding decimal point is on.

With the possible exception of the LCD, all parts for the DVM are available from the usual mail-order houses. Also available is an evaluation kit which contains a 7106, an LCD, the passive components to build the bare-bones 0.1999-volt full-scale DVM, and a printed circuit board. The components for the input-voltage divider and decimal-point circuit and the rotary switch and toggle switch must be obtained separately. I used a kit for the convenience of the PC board. However, buying the individual components and assembling them on a piece of perfboard will cut the cost significantly.

Photo A shows the internal construction of the DVM. About ½" of the PC board which is supplied in the evaluation kit is cut away. The cut is made at the upper edge of the pads which accommodate the input jacks. A 1" strip is then cut from the bottom of what remains of the PC board and reconnected at an angle of 90 degrees. Lengths of no. 20 wire restore the connections and provide mechanical support for the strip.

All capacitors except the mica device are mounted on the rear of the board. A piece of perfboard containing the resistive ladder for the input circuit and the decimal-point driver circuit is mounted 1/4" behind the PC board, on fiber spacers. The PC board is mounted 3/8" behind the front panel by means of additional fiber spacers. The entire assembly is held together by 6-32 hardware. The enclosure measures 6-1/4" long by 3-3/4" wide by 2" deep and is of unknown brand. A similar-size mini-box would be a suitable substitute. If a larger enclosure is acceptable, the PC board may be left intact.

Fig. 2 is a schematic of the rf probe, which consists of a resistor, two diodes in series, and a disc-ceramic capacitor. The measured value of an rf waveform corresponds well to the value indicated on the DVM when a 100k resistor is used. A 4.7-megohm resistor might seem the correct choice, given the 10-megohm input impedance of the DVM. However, the ADC is an integrating device which will directly give the rms value of the rectified waveform. Two diodes are used in series to allow measuring rf voltages as high as 30–40 volts.

Photo B shows some construction details of the rf probe. The capacitor is just behind the body of the probe tip, a Radio Shack 274-723 solderless probe tip which is cut to 1-3/4" overall. The component assembly measures 4" from the center of the large portion of the phono plug to the opposite end of the probe tip. The shield for the probe is a 4" length of 3/8"-i.d. copper tubing. The lead from the ground clip is soldered into a notch at the end of the tubing. Taping a 1" "U" into

Parts List for Rf Probe

Part	Value	Part number	Cost
C1	0.01 uF, 50 volt	DC.01/50(J)	.08
D1, D2	1N34A	276-1123(R)	.10
J1		274-346(R)	.45
Alligator clip		270-378(R)	.13
Heat-shrink tubing		278-1627(R)	.50
Phone tip		274-723(R)	.50
Copper tubing (local hardware store)			.50

Parts List for Dc Probe

Part	Part number	Cost
Coiled test leads	278-750(R)	3.99

Vendors For Parts

For part numbers marked (R):
Radio Shack—local
For part numbers marked (J):
Jameco Electronics
1355 Shoreway Road
Belmont CA 94002
(Minimum order $10.00)
For part numbers marked (E):
Electronic Supply Co.
2486 3rd Street
Riverside CA 92507
(minimum order $5.00)
or
Digi-Key Corp.
PO Box 677
Thief River Falls MN 56701

Parts not in Evaluation Kit

Part	Value	Part number	Cost
R6	9.09 meg	1M(E)	4.50
		90.9K(E)*	.50
R7	909k	909K(E)	.50
R8	90.9k	90.9K(E)	.50
R9	9.09k	9.09K(E)	.50
R10	1.01k	1K(E)	.50
		10 Ohms (E)**	.50
R11–R13	1k	271-1321(R)	.06
R14–R16	47k	271-1342(R)	.06
Battery connector		–(J)	.10
Case		270-627(R)	2.39
Battery, 9-volt		23-464(R)	.59
S1, 2-pole, 3-position		275-1386(R)	1.19
S2, SPST		275-612(R)	1.69
Knob		274-415(R)	.40
14-pin DIP socket		–(J)	.17
Hookup wire, #22 stranded		278-1307(R)	2.19

* 90.9k and nine 1M in series; $4.50 is cost of nine resistors.
**1k and 10 Ohms in series.
For R6 through R10, prefix part number with TRW/IRC-RN55D.

Substitutes for Parts in Evaluation Kit

Part	Value	Part number	Cost
R1	100k	271-1347(R)	.06
R2	47k	271-1342(R)	.06
R3	27k	271-1340(R)	.06
R4	1 meg	271-1356(R)	.06
R5	1k, variable	43P-1K(J)	1.19
C1	100 pF	DM15-101J(J)	.35
C2	0.1	MY.1/100(J)	.27
C3	0.47	MY.47/100(J)	.45
C4	0.22	MY.22/100(J)	.33
C5	0.01	MY.01/100(J)	.12
Perfboard		84P44WE(J)	2.95
A/D converter/driver		ICL7106CPL(J)	9.95
Banana jacks (2)		274-725(R)	.69
Battery holder		270-326(R)	.30
40-pin DIP sockets		–(J)	.49
3½-digit LCD			

Unless otherwise shown, resistors are ¼ W, 5%, carbon. 100-pF capacitor is dipped mica; others are mylar™, 100 V, with values in microfarads. Cut one 40-pin socket in half, lengthwise, to accommodate width of display. Evaluation kit 7106EV/Kit may be obtained from Jameco Electronics for $34.95.

the lead avoids stressing the solder joint.

The first step in assembling the probe is to tape the exposed leads. Then the component assembly is slipped into the copper tubing so that the free lead from the 1N34A lies on the solder joint of the lead from the ground clip. The phono jack is soldered in two or three places. When the tubing has cooled, the free end of the diode is quickly soldered into the notch. Finally, a piece of heat-shrink tubing is used to cover the tubing. The cable for the probe consists of a piece of RG-174 coax with a phono plug at one end and a pair of banana plugs at the other.

Once the DVM is built, calibration is simple. Select the appropriate range and connect a known dc-voltage source. Adjust R1 until the correct value is displayed. A new 1.5-volt battery is a convenient source. ■

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2N1562	19.99	2N4957	2.93	2N5922	8.50	MRF231	9.28	MRF475	2.65
2N1692	21.25	2N4959	1.95	2N5923	21.25	MRF232	10.25	MRF476	1.70
2N2857JAN	3.49	2N5090	11.73	2N5941	19.55	MRF233	10.75	MRF477	12.70
2N2857JANTX	3.49	2N5108	2.93	2N5944	8.80	MRF237	2.70	MRF492	19.55
2N2876	11.49	2N5109	1.45	2N5945	9.80	MRF238	11.75	MRF502	0.90
2N2947	15.60	2N5160	2.95	2N5946	12.25	MRF239	14.65	MRF503	5.10
2N2948	11.05	2N5177	18.40	2N6080	8.80	MRF245	30.30	MRF504	5.95
2N2949	13.19	2N5179	0.88	2N6081	10.25	MRF247	30.30	MRF509	4.25
2N2957	1.32	2N5126	47.60	2N6082	10.75	MRF304	36.95	MRF511	9.10
2N3375	14.55	2N5583	2.95	2N6083	11.25	MRF309	28.75	MRF515	1.70
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Meeting Ends Make

These ten tips will better your club. Are you friendly or frigid?

Recently, a ham I know moved to an area which has two ham clubs. *"And they're both mighty big bombs!"* he told me.

I asked him what he meant.

"I went by myself to the club meetings—they were on different nights, of course. When I arrived, at both clubs, there were about 20 members already there, shooting the breeze in small groups. *Man, were they unfriendly!"*

But, of all the problems hams face, are unfriendly clubs worth worrying about?

If you need statistics, the answer is that no one knows. While there are more than 2,600 amateur-radio clubs in the United States, no one keeps score of just how many could be rated "unfriendly."

But if you ask—as I have—a number of hams who move often or who travel frequently and visit local clubs, you, too, may be surprised at just how widespread the problem seems to be.

Ask, for example, hams who belong to such clubs as the Naval Postgraduate School Amateur Radio Club in Monterey, California. Most of the members are service personnel who move to new duty stations every couple of years or so, joining new clubs across the country and abroad. Several members of the Monterey club have told me of their firsthand experiences about just how friendly or unfriendly some clubs are.

Yet it's a problem that's hard to pinpoint.

Many hams are reluctant—understandably—to name clubs or even cities in which they feel clubs are unfriendly. As one unhappy member put it, "No use me mentioning names and making them still more unfriendly!"

Yet every example and quote in this report came from hams who have faced frigid receptions at various ham clubs.

Another reason the problem of unfriendly clubs is hard to pinpoint is that what makes a club seem unfriendly to one ham may lead another to consider that club as desirable. One newcomer told me, "When I went to my first meeting at this one club, no one even asked me if I wanted to join." But another ham said, "I don't like clubs which try to push you into joining the first time you come."

Still, in spite of such conflicting views and the lack of data on how many clubs could be rated "unfriendly," there are enough hams telling horror stories about unfriendly clubs to suggest it might be wise for all ham clubs—and their members—to take a careful look at themselves, to make sure they do in fact make newcomers feel welcome.

From listening to hams who belong to a variety of amateur-radio clubs in different cities, I've identified ten tips on how to make and keep your club "neighborly," to use the word of a young ham from Iowa I talked with recently.

The first tip came from an experience told to me by a ham on the day after his first visit to a club.

"I walked in at 7:25 pm, five minutes before the meeting was to start. A couple dozen members were already there. A few of them were talking to someone next to them. The rest were silent—just sitting there, not saying a word. Only a few glanced at me as I stood at the door, trying to figure out where to sit. No one invited me in. Not a one said anything to me or even gave me a nod."

Tip #1: Ham clubs should designate two or so of their members to be greeters, to welcome newcomers.

Greeters don't have to be—shouldn't be—formal. They don't have to stand at the door, wear neckties and jackets, have a set patter, escort newcomers during the entire meeting, or such. Instead, greeters should simply keep an eye on the clubroom door as they mix with other members; when they see an unfamiliar face, they

should go over immediately, introduce themselves, and initiate the usual ham talk. Such face-to-face meetings need not be much more structured than the usual on-the-air QSO.

Once the greeter has learned a few of the special interests of the newcomer, he or she should introduce the guest to another member with similar interests. The point is, of course, to make sure first-time visitors are not left on their own to search out members with whom they may feel comfortable.

To prod my friend to tell me more about that club which ignored him as he walked in to its meeting, I asked, "So what did you do?"

"There were just three empty chairs. They were all together, at the far end of the table. I walked down to them. No one asked me to sit or anything. I waited a few seconds and then sat down. The guy next to me gave me a glance and then went on with his small talk to the ham across the table."

I prodded again: "Not very friendly, huh?"

"After waiting what I thought was a proper length of time for a break in the chatter, I introduced myself to the two guys. One said 'Hi,' gave me his call, and went on with his talk about the weather or something."

Tip #2: All club members should be urged to talk with newcomers.

This is so basic it's almost embarrassing to mention. But of course the problem is *not* that hams are socially unsophisticated, not knowing that they should talk to others. Rather, many of us get so involved in our own discussions of hamming that we may ignore others.

Hams, like many people everywhere, can benefit from increasing their sensitivity to the interests and needs of others, especially to newcomers. That will not only make recent arrivals feel welcome, but also it will help you feel better. As American humorist Philander Johnson wrote, "New friends leave the heart aglow."

My friend's concern about unfriendly ham clubs sounded deep, so I urged him on: "Meet anyone later in the meeting?"

"The meeting started out with the usual self-introductions. You know, they went around the room, each ham giving his or her name and call. When it came my turn, I said just what the others had—my name and call—adding that I'd just moved into the area."

"Did that spark any interest?"

"Not a bit. The self-introductions continued."

Tip #3: Make all introductions worthwhile.

Many clubs open meetings with self-introductions which are given quickly and briefly; many are muttered, some are embellished with bits of "in" humor, getting laughs from only a few. Such self-introductions become so routine they are close to meaningless.

I asked several long-time members of various clubs, "What good are those introductions?" Answers were limited.

"Gets members participating." (Saying just three or so words equals participation?)

"We get to know who's here." (To find that out, most members have already looked around long before the self-introductions.)

"Lets everyone have a moment in the spotlight." (Hams, with all their distinctive skills and achievements, need that?)

Introductions should not take much time of a meeting, but they should be valuable. Members should be encouraged to speak slowly, clearly, and add a few words about their recent activities, interests, or such. Setting a limit is wise—the membership guide for one group states, "No more than 20 words."

One good technique for improving introductions was suggested by Gene Piety KH6PP, now living in Santa Cruz, California:

Tip #4: Have a greeter introduce newcomers.

Only a few words are needed: "Here's a ham new to our area, interested in home-brewed rigs. He's just moved here from (. . .). His name is (. . .); his call is (. . .)."

An interesting technique to add friendliness to clubs was initiated by Bill Webb NK6H, of Monterey, California, when he was president of his local ham club:

Tip #5: At each club meeting, have one or two members give, say, a 5-minute autobiography, preferably with slides, artifacts, or such, detailing their shack and their interests beyond hamming.

These, of course, should not be formal speeches. Brevity is the key.

There is the problem that some members may be hesitant to give such talks. Perhaps they overlook the fact that when they're A3-ing, there may well be far more people listening than are at their club meetings. So start by asking those members who seem to like to get up and speak. Also ask frequently for volunteers—that apparently shy one may well be masking a stimulating speaker! After a few members have presented themselves, most of the others will usually want to take part, too. Certainly some may be strictly against getting up to give such talks, but there's no need to pressure them into participating.

Another idea to help clubs welcome newcomers came from this story told by a ham in central California—that's as close as he wanted to identify this club.

"After my first meeting, when I got home, I realized I really hadn't learned much about the club. Sure, I heard the treasurer's report—they had several hundred dollars in the till. But since they didn't say what activities they're into, I couldn't tell if they had money or not. The president said the newsletter gave details about an upcoming field day, but I didn't see a copy—they were mailed to the members' homes. And I met a couple of guys, but too fast for me to remember all their names and calls."

Tip #6: Give information packets to newcomers.

The packets should include, at the very least:

1. List of members with their calls, addresses, and phone numbers.
2. List of committees—members and tasks.
3. Minutes of the last few meetings.
4. Copies of recent newsletters.
5. Schedule of activities.
6. Repeater frequencies for the area.
7. A copy of the club's constitution.
8. Instructions on joining.

Other materials some organizations give to new members—although I know of no ham clubs which provide these—include:

1. Local sources for equipment, parts, services, etc.
2. List of names of members' spouses and children (helps develop family involvement).
3. History of the club.
4. A few copies of articles about the club—say the top three articles published in the last year or so.

Here's the experience of another ham. It's valuable because it points to another tip to help ensure that visitors don't come to just one of your club's meetings and then never show up again.

"The club's secretary gave me an application form for joining the club. I

thought that was a nice touch. Later, I read the application. It included a statement I was to sign, agreeing to abide by all provisions of the club's constitution. That seemed overly formal, but I figured, well, maybe they have a good reason for that provision. Only they hadn't given me a copy of the constitution. And when I asked for a copy, I was told it was being revised and would be ready in a month or so, but not to worry, just go ahead and sign anyway."

Tip #7: Give newcomers a copy of the constitution, rules, by-laws, or whatever guides your club.

Even if your constitution, for example, is being revised, prospective members should be given a copy of it so they'll know the ground rules as they are at the moment. Many prospective members consider such documents quite seriously. They like to know what they're getting into—how decisions are made, dues increased, leaders selected, and such. They *don't* agree with the advice of American writer George Ade: "To ensure peace of mind, ignore the rules and regulations."

An officer of one ham club I visited handed me an application form on which two members were to sign as "sponsors" of new members. But since I didn't know anyone in the club and since neither that club officer nor that form told me how to get sponsors, membership seemed to be blocked. Therefore:

Tip #8: If new members are to be sponsored by established members, make sure information on how to get sponsors is readily available.

Of course, if a member brings a newcomer, he or she most likely would be a sponsor and would usually help find additional sponsors, if needed. But clubs which require sponsors should have a method for providing them for prospective members who come on their own to a club's meeting. Greeters or club officers might be appropriate sponsors.

Another problem for newcomers is highlighted on the second page of *The Radio Amateur's Handbook*: "One of the *first obstacles* for a person seriously interested in amateur radio is finding a local amateur to provide assistance. This volunteer amateur is called an 'Elmer.'" (Emphasis added by author.)

Finding an Elmer should certainly *not* be an "obstacle."

Rather, an Elmer should be immediately available to every newcomer—to prospective hams, to new hams, and—just as important—to established hams who move into a new area.

But there's an additional problem with many Elmers today. They may tell a newcomer something such as, "If you need help, give me a ring."

That's not really much of an offer of help. Elmers should do more than that. One good example is J. V. Rudnick K6HJU of Felton, California, who has been Elmer to scores of hams. He drops by a new ham's shack a few days after they meet. He comes with tools, ready to spend a few hours, if needed, to help find electrical interference, check out a new rig, select an antenna location—all examples from his recent Elmering.

Tip #9: Ensure that every prospective member gets an Elmer—an active Elmer, a real Elmer.

Finally, the essential tip:

Tip #10: Evaluate your club and yourself: How do you think newcomers would rate you?

Are you and your club friendly or frigid? ■

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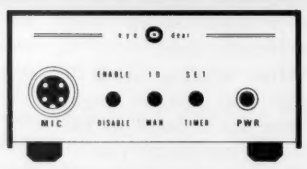

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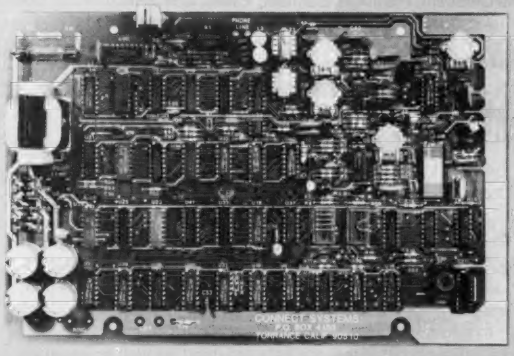

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Tester Project: England '83

Wherein you flash-chance transistors, chap.

Reprinted by permission from the May, 1983, issue of *Radio & Electronics World*, 200 North Service Road, Brentwood, Essex, CM14 4SG, England. The transistor tester was designed by R. A. Penfold, 12 The Crescent, Hadleigh, Benfleet, Essex, SS7 2HF.

Transistor testers normally fall into one of two categories: basic units where a flashing light indicates serviceable devices, or calibrated metering circuits which give a rough indication of current gain. Our design is really a cross between these two. It uses a flashing 10-LED bar graph to indicate whether or not the transistor is usable—the number of LEDs activated gives an indication of current gain. This novel system enables checks to be made very rapidly and easily, as well as providing more reliable and informative results than a single-LED tester.

Design

The basic setup used in the transistor tester is shown in Fig. 1. Schematic (a) shows the block connections for testing PNP transistors and (b) shows the slightly different arrangement needed when checking NPN devices.

Looking first at the PNP mode, a low-frequency oscillator drives the base of the text device via a resistor which sets the base current. The transistor is thus switched on only when the output of the oscillator is in the low state (it is cut off when the output is high). A zener diode is used to give a stable output voltage from the oscillator so that a reasonably stable base current results.

The bar-graph driver and display are fed with the voltage developed across the collector load resistor. Circuit values are chosen so that a very low gain device produces only sufficient voltage to activate one or two LEDs, while a very high gain device will activate all ten. So, with a serviceable device being tested, the LED display should flash on and off, and the number of LEDs will indicate the gain.

In the NPN mode, an oscillator, zener stabilizer, and series resistor are again used to pulse the base of the test transistor with a reasonably

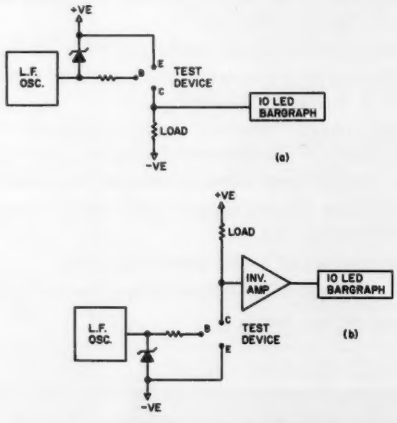

Fig. 1. The two basic circuit configurations for testing NPN and PNP transistors.

CIRCUIT DESCRIPTION

The full circuit diagram of the transistor tester is shown in Fig. 2. The LF oscillator is a straightforward 7555 astable, operating at a little over 1 Hz. IC1 is a CMOS version of the 555, used primarily because of its low current consumption. In order to permit the use of very simple NPN/PNP switching, separate NPN and PNP test sockets are used, as well as separate zener stabilizers and base resistors. In the prototype, there was a tendency for very high gain PNP transistors not to cut off properly due to the output of IC1 going slightly less than fully positive on the appropriate output half cycles. This problem was completely overcome by making R4 and R5 a little higher in value, and adding R3; which have no significant effect on circuit operation in other respects.

The closed-loop gain of the circuit is accurately set at unity by R10 and R13. R6, R7, R11, and R12 are close-tolerance components so that consistent results are obtained when moving from PNP mode to NPN.

R8 and R9 form the load resistance for NPN devices, while R14 and R15 are the load resistance for PNP devices. The value of R15 sets the operating-current range of the unit. It varies from about 450 uA, with one LED switched on, to around 12 mA with all ten activated. This gives a reasonable operating current for low gain devices, whilst removing the need for excessive current flow when high gain transistors are being tested. R14 is added in series with R15 merely to provide additional current limiting if a closed-circuit device is checked.

Switch SW1 is all that is required to give NPN/PNP switching. It switches the input of the display circuit to either the output of IC2 or the PNP-collector test socket (note that IC2 has a class A output stage which enables its minimum output voltage to swing down to near the negative supply potential).

The display driver is an LM3915N integrated circuit (IC3), which is similar to the popular LM3914 device. The LM3914 has ten *linear* LED threshold voltages, whereas the 3915 has a *logarithmic* scale with the LED threshold voltages at 3-dB intervals. This enables a wider range of current-gain values to be covered, with the maximum value being about thirty times higher than the minimum. R16 controls the LED operating current, and the specified value provides around 4.5 mA.

stable current. However, there is a minor complication in that the voltage developed across the load resistor is relative to the positive supply, whereas the bargraph driver requires an input voltage referenced to the negative supply rail. A unity-gain inverting amplifier is therefore used between the load resistor and the display driver to give a suitable input signal for the latter.

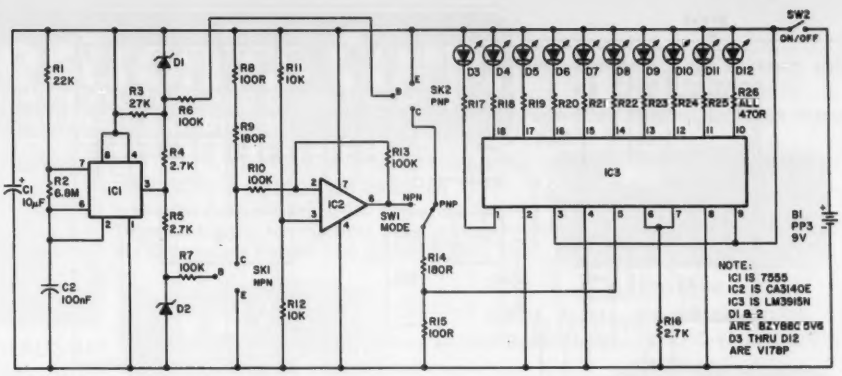

Fig. 2. Complete circuit of the tester.

Construction

Practically all the components are fitted on the printed circuit board, the only exceptions being the battery and the sockets. Details of the PCB wiring are provided in Fig. 3. If the specified case is used, the two cutouts in the corners of the board are necessary to mount flush with the pillars inside the case.

It is essential that the mounting holes for SW1 and SW2 are accurately positioned on the front panel. One way of ensuring a good fit is to use the board as a template. It is probably best to initially drill small guide holes of about 1 mm in diameter.

Construction of the PCB is quite easy, but note that IC2 has an MOS input stage. Although IC1 is a CMOS device, it does not require any special handling precautions. The tags of SW1 and SW2 should be pushed right down into the board before these components are soldered into place.

The test sockets are two groups of three 1mm sockets, and provided each set of three is tightly grouped, it will be possible to fit most transistors directly into these without difficulty. A set of test leads can be used to make connections to transistors that will not plug into the sockets. The tags of the sockets should be bent at right angles so that they do not come into contact with the PCB when it is fitted into the case.

Operation

In use, the mode switch is set for NPN or PNP, and the test device is connected to the correct sockets. If the device is functioning prop-

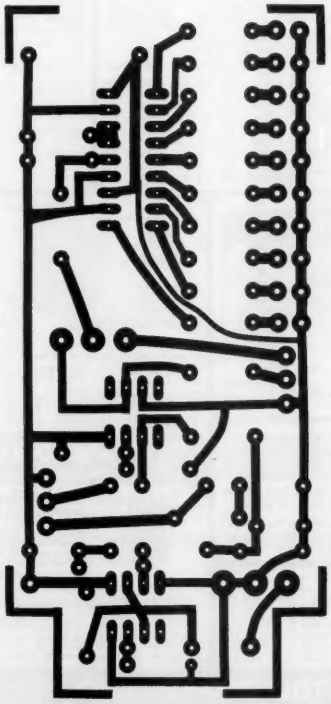

Fig. 3. PC board, foil side.

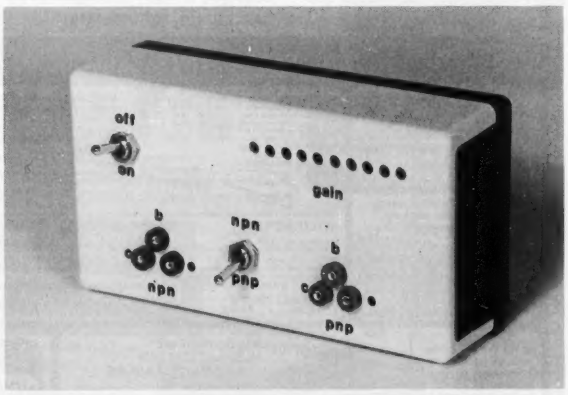

Photo A. The transistor tester.

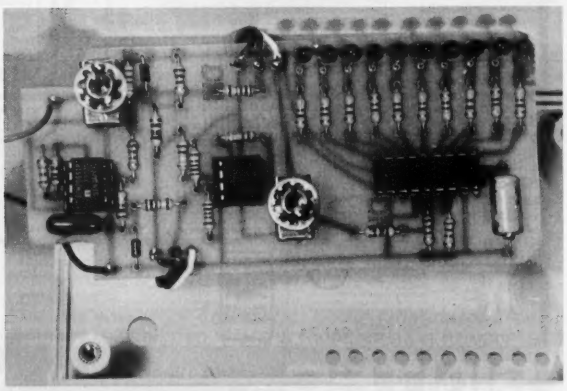

Photo B. Inside the transistor tester.

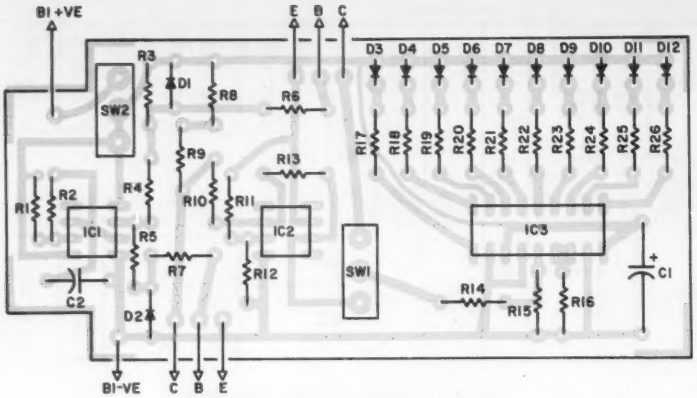

Fig. 4. PC board, component side.

erly, the LED display should flash on and off with a suitable number of LEDs being switched on. It is a good idea to test a number of transistors of various types, which are known to be fully operational, so that you know the approximate number of LEDs that should be activated when testing a suspect device.

If the LED display lights continuously, this indicates that the device under test is closed circuit, but check to be sure that SW1 is in the right position and that the device is connected correctly. If not all of the LEDs switch off, this indicates that the test device is faulty and has a high leakage level, but again, check that it is connected correctly and that SW1 is in the right position. Also, do not hold the transistor in the test sockets touching the base and collector leads. This could supply a small current into the base of the component giving a high enough collector current to activate one or two LEDs. If the display fails to light at all, it indicates that the transistor under test has gone open circuit. ■

Parts List

Resistors

¼ W, 5% unless stated otherwise

R1	22k
R2	6.8 megs
R3	27k
R4, 5, 16	2.7k
R6, 7, 10, 13	100k (1%)
R8, 15	100R
R9, 14	180R
R11, 12	10k (1%)
R17–26	470R

Capacitors

C1	10 uF, 25 V
C2	100 nF mylar™

Semiconductors

IC1	ICM7555
IC2	CA3140E
IC3	LM3915N
D1, 2	BZY88C5V6
LED1–10	(3mm red LEDs)

Miscellaneous

SW1, 2 SPDT min toggle switch
B1 9-volt battery
SK1, 2 1mm wander
Sockets (see text), plastic case (120 × 65 × 40mm), battery connector, PCB, pins, wire, etc.

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Stock No.	No. of Pins	1-9	10-49	50
11055	24	4.98	$4.35	$3.90
11056	28	5.15	4.50	4.05
11057	40	6.81	5.95	5.35
11058	64	12.02	10.50	9.45

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Stock No.	No. Pins in IC	Price
22225	14	$.29
22226	16	.29
22228	18-20	.29

SCREW MACHINED SOCKET PINS, loose, packaged in bags of 100. Stock No. 11310 is solder tail with gold collet tin shell. Stock No. 11311 is wire wrap with gold collet gold shell.

Stock No	Description	1 Bag	5 Bags	10 Bags
11310	Bag of 100 solder tail pins	$ 4.95	$ 4.45	$3.95
11311	Bag of 100 wire wrap pins	11.95	10.75	9.50

WILD ROVER
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Stock No.	1-9	10 & Up
12098	$1.42	$1.28

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Stock No	Dia	Length (feet)	Weight (oz.)	Price
50075	062	9	1.5	$1.16
50076	062	25	4	2.39
50077	062	50	8	4.25
50078	032	33	1.5	1.31
50079	032	88.5	4	2.47
50080	032	175	8	4.57

TI WIRE WRAP SOCKETS
Tin plated phosphor bronze contact – 3 wrap

Stock No.	No Pins	1-99	100-499	500
11301	8	$.40	$.36	$.30
11302	14	.59	.54	.45
11303	16	.64	.58	.48
11304	18	.73	.66	.55
11305	20	.99	.90	.75
11306	22	1.12	1.02	.85
11307	24	1.25	1.14	.95
11308	28	1.52	1.38	1.15
11309	40	2.05	1.86	1.55

TI LOW PROFILE SOCKETS
Tin plated copper alloy 688 contact pins with gas tight seal.

Stock No.	No Pins	1-24	25-99	100-999
11201	8	$.10	$.09	$.08
11202	14	.14	.13	.12
11203	16	.16	.15	.14
11204	18	.18	.17	.15
11205	20	.20	.18	.16
11206	22	.22	.20	.18
11207	24	.24	.22	.20
11208	28	.28	.26	.25
11209	40	.40	.37	.33

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03303	16	28.80	24.48	20.16
03305	24	43.20	36.72	30.24
03308	40	71.98	61.18	50.34
03309	50	89.98	76.48	62.99

#28 AWG Stranded Flat Cable ("GREY" cable)

03313	14	$ 28.98	$ 24.38	$ 20.08
03315	16	33.78	27.98	22.95
03317	24	48.16	41.79	34.41
03323	40	81.94	69.65	57.36
03324	50	102.42	87.06	71.69

#28 AWG Stranded Color-Coded Cable

03330	14	$ 43.94	$ 37.35	$ 30.76
03332	16	50.24	42.70	35.17
03334	24	75.32	64.02	52.72
03340	40	125.52	106.69	87.86
03341	50	156.90	133.37	109.83

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Stock No.	Electrical	Price	
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Stock No	Color	1	100
12082	Red	$1.12	$ .99
12085	Green	1.84	1.63
12087	Yellow	1.92	1.70
12089	Orange	2.08	1.84

Right Angle Socket for Above Displays

Stock No.	1	100
11010	$1.24	$ .99

OPTEL LCD's with pins

Stock No.	Description	1	10
47005	3½ dig, .5"	$ 5.95	$ 5.50
47006	4 dig, .5"	5.95	5.50
47007	4 dig, .7"	11.90	11.00

Stock No. 47005
Stock No. 47006
Stock No. 47007

The Battery Just Wrap™ Tool
New battery powered tool wraps insulated wire around .025" square posts without need for pre-cutting and pre- stripping. Complete with bit and 100 ft. 30 AWG wire.

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13340	Battery just-wrap tool with bit and 100 ft. 30 AWG wire	$59.95
13341	Replacement bit	10.35
13342	100 ft. blue replacement wire	7.54
13343	100 ft. white replacement wire	7.54
13344	100 ft. yellow replacement wire	7.54
13345	100 ft. red replacement wire	7.54

MICRO Charts - colorful 8½" x 11" charts eliminate the need to stumble through manuals and summaries. Fully decoded - instant access - totally comprehensive - gives pin outs, cycle times, buy notes, etc. etc.

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23011	8080A/8085A	5.95
23012	6502 (65XX)	5.95
23013	8048 and relatives	5.95
23014	54/7400 TTL Pinouts	5.95
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PIN FORMING TOOL
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10200	$14.95

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03511	Basic board, 4.5 x 5.5	19.50
03506	Intel SBC-8010 Board, 12 x 6.75	64.95
03507	Motorola M-6800 Board, 9.75 x 6	42.95
03508	S-100 Board, 10 x 5.3	36.95
03509	Z-80 Board, 7.7 x 7.5	39.95
03510	Eurocard Board, 6.3 x 3.9	21.95

OK MACHINE AND TOOL

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Includes DIP IC extractors and inserters to accommodate all ICs from 14 to 40 pins. Tools that engage conductive surfaces are CMOS safe and include ground wrist strap.

Stock No.	
13308	$41.34

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DIP socket sized plastic panels with numbered holes in pin locations. Slip onto socket before wire wrapping to identify pins. Also write on them for location, IC part number, function etc. Simplifies initial wire wrapping, troubleshooting and repair.

13295	14 pin	
13296	16 pin	
13297	18 pin	
13298	20 pin	
13299	22 pin	
13300	24 pin	
13301	28 pin	
13302	40 pin	
13303	9x7 pin	

$1.95 per pack

LOW PROFILE DIP SWITCHES
sealed bottom - gold plated

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10353	5	1.45	1.30
10354	6	1.50	1.40
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10356	8	1.85	1.65
10357	9	2.10	1.95
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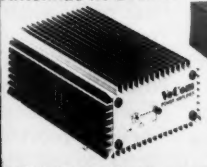

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Sounds Good to Me

Two Texans put together "73 Morse R/T." It's the best Basic VIC-20/C-64 code program you will ever see.

Three things plague Morse code transmit/receive programs. First, the good ones are expensive. Second, the inexpensive ones don't generate good-sounding Morse. Finally, most Morse programs you enter yourself are in Basic and are too slow to generate or copy well-spaced Morse.

So what have we here? True, it's Basic that you must enter yourself, but before you dismiss it as just another Morse program, consider that "73 Morse R/T" has been carefully assembled to make maximum use of Commodore Basic.

Because variables improve program speeds, the program sections using numbers have been created to use the faster variable method. Morse spacings have been carefully guarded, and this program generates the best-sounding code possible in Basic at speeds from 5 to 50 wpm.

73 Morse Receive/Transmit allows type-ahead buffering of up to 255 characters and three (or more) 255-character message buffers into which may be placed a CQ, station brag tape (rig message), and QTH information.

Additionally, a simple interface schematic is included in this article. With it, your Commodore VIC-20 or -64 can be connected to your radio and be used with 73 Morse R/T on the air.

Two items of caution before describing this program in detail. First, if you make program modifications, add no line number preceding line 200. Any line appearing prior to 200 must be processed between each character sent by the program and even a Remark statement will deteriorate the sound.

Second, we suggest you avoid attempting to enter the Receive mode of this program until you have constructed the interface. If you engage the Receive option without an interface attached, 73 Morse R/T will lock and you will be unable to return to Transmit. Until you have constructed the interface (or attached a suitable one), place a Remark (REM:) at the beginning of program line 255 to prevent the lockup. Remember to remove it when you connect an interface.

73 Morse Receive/Transmit supports the following amateur CW prosigns:

Prosign	Key
AR	)
KN	=
SK	–
AS	@
BK	*
BT	=

In addition, Morse error (eight dits) is sent when Return is depressed or an undefined key is struck. The Run/Stop key is an exception and acts as a Break key; if accidentally depressed, type "CONT(inue)".

This program features a 255-character keyboard buffer. If the 255-character limit is exceeded, excess entries will result in the "string too long" error message. Should this occur, enter "CONT" to resume.

The Delete key may be used in the normal manner to make changes and corrections, providing the character to be corrected has not been or is not being transmitted at the time of the attempted correction.

A transmission may be aborted by using the Clear/Home key, but can be called only from the Transmit mode. Exercising this function results in a clear screen and loss of the buffer contents.

Six 255-character buffers

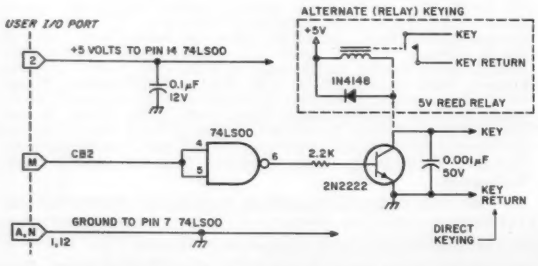


Fig. 1. 73 Morse transmit schematic.

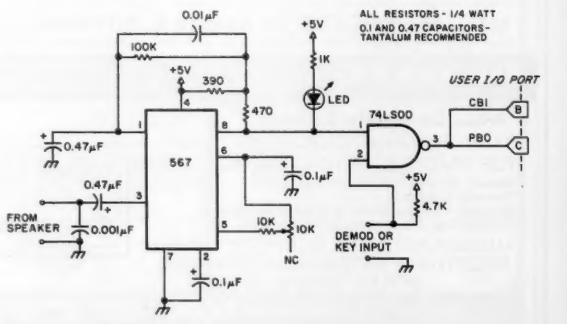


Fig. 2. 73 Morse receive schematic.

are included with 73 Morse R/T. All are accessed from the Function Keys on the right side of the VIC-20 or -64. Earlier, only three were mentioned. The reason for this is that to be useful, one buffer must hold the station callsign input, another the callsign of your station, and the third an HW CPY link.

Although more than suggested data could reside in the preceding three buffers, their function limits the length of the contents. Feel free to change the contents of any buffer (Function Key) as you wish. Details of how this may be accomplished can be understood from reading the following documentation sections.

F1 will send the message contained in program line 310, which in this case is CQ. Any message up to 255 characters in length may be placed in this buffer. You are limited in line length, however, to the default limits of your computer (88 on the VIC-20, 80 on a -64). If your message exceeds these lengths, it is suggested that you add a second line number (in sequence) to complete your message, as illustrated in the link example in program lines 360 and 361. Notice that GOTO 45 appears at the end of the last line of buffer text only and that line contents must be linked as "KS=K$+" on additional lines.

F2 allows you to enter the callsign and name of the station with whom you are engaged. These entries may be left blank, or to change the data you may recall the option and enter a single quote (') when the information is requested. Once a name or callsign has been entered, entering a null will preserve whatever data resides in the memory for those categories.

F3 will send "(his callsign) DE (your callsign)" if a callsign for the station being worked has been entered. Your call must also appear in program line 330.

F4 sends the QTH or other message contained in program line 340.

F5 will transmit "SO HW CPY (name)? (his callsign) DE (your callsign)" followed by the invitation to transmit "(K)". This function demonstrates how two (or more) Function Keys can be linked (concatenated). In this example, F3 is called by F5.

F6 sends the station brag tape (rig message) or the contents of program lines 360 and 361. These linked lines are explained in F1 above. When linking program lines to allow more than the standard line lengths, caution should be exercised on the unexpanded VIC-20, as memory limits can be approached quickly and result in erratic code spacing. Should this happen, abbreviate your messages or add memory expansion.

F7 toggles between Compose and Send modes. When Compose is chosen by a single depression of the F7 key, 73 Morse R/T will allow building your transmission in advance of being sent. It will not function during Receive. Function keys may be embedded during Compose, but remember that the lengths of messages linked in this manner will affect the maximum count of 255 characters. It is easy to exceed maximum buffer lengths unexpectedly in this way. Should an error develop due to this, type GOTO 50 and your transmission will continue with the offending characters removed. Depressing F7 a second time will send your Composed text.

```
10 GOTO200
15 FORL=ITOLEN(M$(A));S$=MID$(M$(A),L,1):M=T:IFS$="-"THENM=DL
20 POKEV,P:POKEW,K:FORD=ITOM:NEXT:POKEV,Z:POKEW,U:FORD=ITOES:NEXT:NEXT
30 FORD=ITOBF:GETK$:PRINTK$;
32 IFK$=CHR$(Q)ANDB$<>""THENB$=LEFT$(B$,LEN(B$)-1):GOTO30
34 IFK$=CHR$(QQ)THENB$="":PRINT"(SC)":GOTO30
36 B$=B$+K$:NEXT
38 IFB$<>""THEN50
40 GETK$:IFK$=""THEN40
45 B$=K$:PRINTB$;
50 A=ASC(B$):B$=RIGHT$(B$,LEN(B$)-1):IFA>LLTHEN250
60 IFA=SPTHENFORD=ITOWS:NEXT:GOTO38
70 A=A-FF:IFA<ITHENA=I
80 GOTO15
100 IFPEEK(C)=ZTHENL=L+I:IFL<HTHEN100
110 L=Z:IFPEEK(C)=ZTHENPRINT" ";
112 IFPEEK(G)=YTHENPOKE198,Z:GOTO245
115 IFPEEK(C)=ZTHEN112
120 L=L+I:IFPEEK(C)THEN120
130 IFL>HTHENX=X+X:H=(E$H+L+L+N)/F:GOTO150
140 X=X+X+I:H=(H+H+H+L+L+J)/B
150 L=Z:IFX>RTHENX=I:GOTO100
160 IFPEEK(C)=ZTHENL=L+I:IFL+L<HTHEN160
170 IFNOTL+L<HTHEN190
180 IFPEEK(C)THENL=Z:GOTO100
190 PRINTMID$(R$,X,I);:X=I:L=Z:GOTO100
200 DIMM$(51):FORL=1TO51:READM$(L):NEXT:S=20
210 PRINT"(SC)(CR) 73 MORSE SEND/REC":PRINT"(CD)(CD)(CD)SPEED (5 TO 80)(CR)(CR)"8"(CL)(CL)(CL)(C
L)(CL)";
215 INPUTS:IFS<5ORS>80THEN210
220 PRINT"(SC)":POKE36878,15:V=36876:P=230:Z=0:W=37148:K=222:U=254:T=2300/S^1.25
225 BF=T/12:ES=7500/S^2:FF=39:LL=90:SP=32:WS=3*T:DL=3*T:IFS>30THENDL=48T
230 R$=" TEMNAIOGKDWRUS??QZYCXBJP?L?FVHO9?8?????+&??/=61????)?82????3!45"
235 R$=R$+"???????:????,?????(??;????????-??'????????.??'?????????????"
240 B=4:E=9:F=12:H=16:C=37136:G=197:I=1:J=2:N=6:Q=20:QQ=19:R=122:X=1:Y=8:POKE37138,254
245 PRINT:PRINTSPC(9)"(RV)XMT(CD)":GOTO40
250 IFA>132ANDA<141THENA=A-132:ONAGOTO310,330,350,370,320,340,360,380
255 IFA=95THENPRINT:PRINTSPC(7)"(RV)RECEIVE(CD)":GOTO190
260 GOTO210
310 K$="   CQ CQ CQ DE W5VKC/1 W5VKC/1 K ":GOTO45
320 PRINT:PRINT:INPUT"STATION CALL";C$
325 PRINT:INPUT"NAME";N$
328 PRINT"(SC)":GOTO40
330 K$=" "+C$+" DE W5VKC/1 "+B$:GOTO45
340 K$=" QTH PETERBOROUGH, NH? PETERBOROUGH, NH. = "+B$:GOTO45
350 K$="SO HW CPY "+N$+"? )(??)K":GOTO45
360 K$=" RIG HR   TEN TEC CENTURY/21 INTO A DIPOLE =  KEYING WID A VIC 20 COMPUTER"
361 K$=K$+" = FRIEND WB5AYD WROTE SOFTWARE = "+B$:GOTO45
370 B$="":PRINT"(SC)"SPC(6)"(CD)(RV)COMPOSING(CD)"
371 GETK$:IFK$=CHR$(136)THENPRINT:PRINTSPC(6)"(RV) SENDING (RO)(CD)":GOTO38
372 IFK$=""THEN371
373 PRINTK$;:IFASC(K$)>132THENPRINT"(RV)"MID$("1357246B",ASC(K$)-132,1)"(RO)";
374 IFK$=CHR$(20)THENB$=LEFT$(B$,LEN(B$)-1):GOTO371
375 IFLEN(B$)=255THENPRINT"(RV)";:GOTO371
376 B$=B$+K$:GOTO371
380 K$=" DE W5VKC/1 "+B$:GOTO45
500 DATA.....,.-.-,-...-.-,-.--,.--.--,...-.-,.-.-.-,-.-.
510 DATA-----,.----,..---,...--,....-,.....,-....,--...,---..,----.
520 DATA---...,-.-.-,(,-...-,),..--...-...
530 DATA.-,-...,-.-,-.-.,.....-,--.,....,..,.---,-.-,.--,--,-.
540 DATA---,.--.,-.-.,-.-,...,-,..-,...-,.--,-..-,-.--,--..

READY.
```

Program listing.

```
20 POKEVO,F:POKEW,K:FORD=ITOM:NEXT:POKEVO,Z:POKEW,U:FORD=ITOES:NEXT:NEXT
205 POKE53281,0:POKE53280,0:PRINT"{WH}{SC}":FORI=54272TO54296:POKEI,0:NEXT
210 PRINTSPC(10)"J/64 MORSE SEND/REC":PRINTSPC(9)"{CD}{CD}{CD}SPEED (5 TO 80){CR}{CR}"S"{CL}{CL}
{CL}{CL}{CL}";
216 POKE54272,65:POKE54273,51:WF=54276:AD=54277:SR=54278:WV=65:WI=WV+1
217 POKEWF,WI:POKEAD,Z:POKESR,240:POKEWF,WV:POKE54275,8:POKE54274,0
220 PRINT"{SC}":VO=54296:Z=0:W=56576:K=147:U=151:T=2300/S^1.25
240 B=4:E=9:F=12:H=16:C=56577:G=197:I=1:J=2:N=6:Q=20:QQ=19:R=122:X=1:Y=57
241 POKE56579,254
245 PRINT:PRINTSPC(18)"{RV}XMT{CD}":GOTO40
255 IFA=95THENPRINT:PRINTSPC(16)"{RV}RECEIVE{RO}":GOTO190
360 K$=" RIG HR TEN TEC TRITON 4 INTO A DIPOLE = KEYING WID A CBM 64 COMPUTER"
370 B$="":PRINT"{SC}"SPC(15)"{CD}{RV}COMPOSING{CD}"
371 GETK$:IFK$=CHR$(136)THENPRINT:PRINTSPC(15)"{RV} SENDING {RO}{CD}":GOTO38

READY.
```

C-64 modifications to 73 Morse R/T listing.

F8 sends "DE (your call)". Useful for IDs and QSK.

Note in line 340 (and others) the buffer (B$) is added to the message, preventing the contents of the buffer from being lost. This enables the messages to be used within text in either the Direct or Compose modes. In the Compose mode only, a reversed number representative of the inserted Function Key will appear within text. Although not represented in Send, the Function Key will be transmitted.

Receive

With a suitable interface connected, Receive may be entered by depressing the back-arrow (escape) key. A second push of the same key returns to the Transmit mode, and in this way the key toggles between modes. The back-arrow key may also be implanted in text. When encountered, the modes will change.

The simplicity of the receive circuitry on the accompanying schematic is roughly representative of the function refinements. Although accurate and flexible, these restrictions suggest several actions to ensure optimum results.

The variable resistor is used to adjust the loop frequency. Loop adjustment should coincide with the center frequency of the CW filtering engaged. For example, a 750-Hz (typical) filter would require your interface loop be adjusted to 750 Hz—the idea being to adjust the LED to brilliance with full filtering engaged.

As a digital device, the VIC requires spaces of silence between Morse characters for recognition. Therefore, rf gain should be adjusted to permit the LED to extinguish between keying. In other words, tune in the desired signal and reduce rf gain to a point where QRM does not keep the LED from blinking. A threshold adjustment (squelch) would be helpful here, but is not within the scope of this article.

Any suitable interface can be driven with 73 Morse Receive/Transmit. The prerequisite is that the interface in use is TTL-compatible and goes low on keying applied to the external DEMOD input on the interface included here.

Although there is an upper limit to receive copy speed, we have successfully decoded 30-word-per-minute CW generated by HAMTEXT and MBATEXT with this program—admirable for Basic. We feel VIC-20 and C-64 Basic has been optimized at this point. Morse transmission at speeds in excess of 65 wpm is possible and has been decoded by the previously mentioned commercial programs. At speeds approaching 80 wpm, 73 Morse R/T is detected with excess spaces but remains readable.

It is important to mention that no CW decoder will copy poorly sent CW. If, for instance, the transmitting station sends a question mark as "IZ", then "IZ" will be displayed.

In view of this restriction to accuracy inherent in all time-based microprocessors, we recommend you remain faithful to your own receiving speeds and not dive into a speedy QSO you can't keep up with should your VIC crash. If you parallel a key alongside the computer, you can always request QRS if your program or VIC crashes in mid-QSO and you find yourself adrift without oars.

Circuit Notes

The transmit section of 73 Morse Receive/Transmit utilizes the CB2 (RS-232 Sout) signal at the User I/O port on the VIC-20 and -64. CB2 will go low when the transmitter is to be keyed. This further enables the Run/Stop/Restore sequence to interrupt keying at any time and prevents the computer from keying the transmitter on power-up initialization or Reset.

For Receive, this program makes use of the PB0 signal at pin C and the CB1 signal (RS-232 Sin) at pin B. PB0 must go high when a received signal is detected. Although CB1 is not used, it is connected in anticipation of the later addition of RTTY and ASCII upgrades.

The 567 tone-decoder IC is available at most parts stores and is common.

A 12/24 .156 spacing connector is required for this interface. Lacking one, a 22/44 pin connector (common) can be cut to fit. The interface may be constructed on a piece of perforated board and the underside of the connector attached to the board with strong (two-part) epoxy. Refer to the manual furnished with your computer for pinouts.

Do not attempt to key a rig which presents more than +30 V or *any* negative voltage at the key terminals with the direct keying portion of this circuit, for damage to your computer will likely result. Provision for total isolation of the type necessary to permit safely keying such transmitters can be made through a common reed relay using the alternate keying section of the schematic.

Acknowledgements

The authors of this program would like to acknowledge conceptual assistance from Jim Thomas W9OAG, whose application of the 567 tone-decoder circuit appeared on an interface card for CW split-screen on the ZX-81 and was used by permission. Additional thanks to Cliff Nunnery NU4V from whom the ZX-81 program and interface are available. Automatic receive-timing adjustments used in this program were based on the equations of J. C. Sprott W9AV, who created them for the TRS-80 computer.

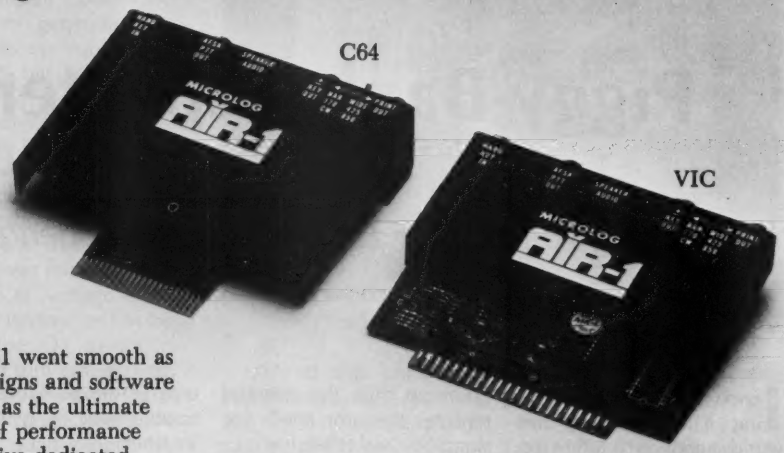
Notes

If in testing this program you notice scrambled CW, look for an added or missing comma in the Data statements of lines 500 through 540.

Users of the Commodore-64 should replace any existing program lines in the VIC version with those appearing in the 64 modification listing, adding those not shown in the VIC listing.

This program previously appeared as J/20 Morse R/T in the bi-weekly *Journal/20* and has been in use for over a year. It is in the public domain.■

The Evolution of a Superior Terminal for RTTY and CW



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Peter H. Putman KT2B
84 Burnham Road
Morris Plains NJ 07950

Piggy-Bank Repeater Project

Set it and forget it.
This inflexible controller doesn't bend the budget.

I know what you're thinking. The last thing this world needs is another repeater control, right? (Some would say the last thing we need is another repeater, period, but that's another matter altogether.)

The past few years have seen a proliferation of microprocessor-based repeater controls offered for sale in *73*, *HR*, *QST*, and other magazines. While it's certainly true that these units do offer an amazing array of functions, bells, whistles, and the like, it can be said that such systems may be far more than the average repeater operator needs for simplicity and reliability.

The circuit described here won't win any engineering awards but won't break your bank, either. What's more, all of the parts can be obtained easily. The emphasis is on "set-and-forget" operation, so there are a minimum number of functions to fuss with when performing the final installation. Best of all, this circuit lends itself well to modular designs, such as plug-in cards. In this particular case, this meant the end of the wonderful January trips to the repeater site to troubleshoot in minus 10° weather.

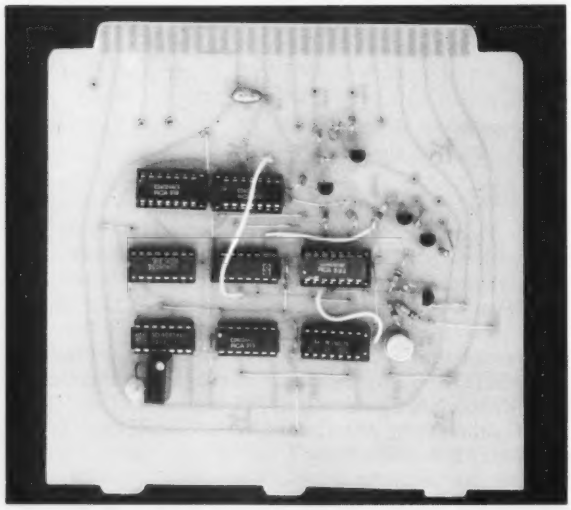

Photo A. Completed board minus the LEDs.

The Split Rock ARA repeater in Rockaway, New Jersey, had used for many years a circuit based on first-generation TTL devices. When it was first built in 1972, it was a pretty impressive piece of equipment! This controller featured a 1.5-second delayed key-up, a diode-matrix ID generator, a "polite" identifier, and used only 22 ICs, 30 diodes, 3 relays, and numerous transistors to do the job. It was constructed on plug-in wire-wrap boards (presumably to allow for some experimentation) and then the wire-wrap was soldered. With attendant power supply, it took up about 12" by 4" by 6"—not a small package.

Well, time marched on. Pretty soon, chips began to fail about the time that various pieces of circuit documentation were mysteriously vanishing. The identifier began cutting itself off in mid-ID, giving us one of the world's shortest calls, "DE W—". Worst of all, the delayed key-up began resetting on every call, resulting in more "doubles" and "triples" than the World Series!

What to do? The repeater users were ready to march on Washington. Everyone grumbled about the situation. The most popular question at our monthly meetings (after "when do we adjourn?") became, "Hey, when are you gonna fix the ID box?? Hunnhh?"

With visions of a lynch mob firmly in mind, the decision was made to deep-six the old control package in nearby White Meadow Lake and redesign a brand-spanking-new controller. Thus would our repeater move into the 80s!

I had experimented with many Rube Goldberg devices over the years for repeater control, being first attracted to a design using 555 timers. No good! The 555 is surely the most versatile IC ever to grace this earth, but it suffers from a problem common to most one-shots: poor noise immunity. My first attempt at a circuit of this type worked great on the bench, but soon wound up in the garbage, as those poor 555s keyed up on every spike within a mile of our site. Sure looked good on paper, though...

A circuit using flip-flops and unijunction transistors soon made an appearance in the March, 1979, *QST*,[1]

and it looked promising. The user "set" the flip-flop upon key-up, and the UJTs "reset" the flip-flop using the classic RC circuit to determine squelch-tail time. Again, not a bad idea on paper. However, in the repeater, it was soon discovered that the user got erratic squelch tails, if any tail was generated at all!

Using tantalum capacitors and precision resistors didn't cure the problem. RFI and timing problems put this model in the circular file. Back to the drawing board! Although the circuit was a clever design, the fact that the capacitor did not always charge completely on each transmission (especially during a series of rapid QSOs) led me away from using any RC-type delay circuits for future designs.

The problem was just too many variables, such as the quality of electrolytics used, type of UJT used, grade of other transistors, and questionable response in extreme environments. However, the basic concept was halfway there—using flip-flop logic and toggling between set and reset modes. Ah-ha! Now I was getting somewhere, and after studying schematics for the 10,000th time, it occurred to me that a better way would be to use clock pulses to do the job. This meant an on-board clock and appropriate divide-by-X chips. And so was born the final circuit (although more out of desperation than inspiration!).

Refer to Fig. 1 for the schematic. Q1 and Q2 serve to isolate any COR lines from the CMOS logic, as well as provide high enough signal levels for reliable keying action. Either positive- or negative-type COR lines can be used, swinging typically from .5 to 8 volts, or vice-versa. U1, a CD4047 free-running multivibrator, serves as the on-board clock. It is set to about 120 Hz at pin 10. The output from U1 drives U2, a CD4040 ripple counter. These two chips make up the heart of the timing circuit and are never disabled while the circuit has power to it. The clock pulses from U2 are fed to three on-board divide-by-seven chips, U3, U4, and U6, which are all CD4024 types and which generate the delayed key-up, squelch tails, and timeout intervals, respectively.

U4 serves an additional function: It resets the delay line after 10 to 12 seconds of inactivity. Or, if you prefer, it can be disabled. When the user opens the squelch on the repeater receiver, the ensuing COR voltage change (either high-low or low-high) will cause Q1 to go low, which in turn also sets pin 2 of U3 low. This COR signal is also sent to pin 12 of U5A, a CD4001 quad 2-input NOR gate. U3 is now counting clock pulses, and after 1.5 seconds, pin 11 of U3 goes high, setting U7A, a CD4013 dual-D flip-flop. Pin 2 of U7A, the $\overline{Q}$ output, goes low. This signal is sent to the other input of U5A, pin 13. Now we're ready for action.

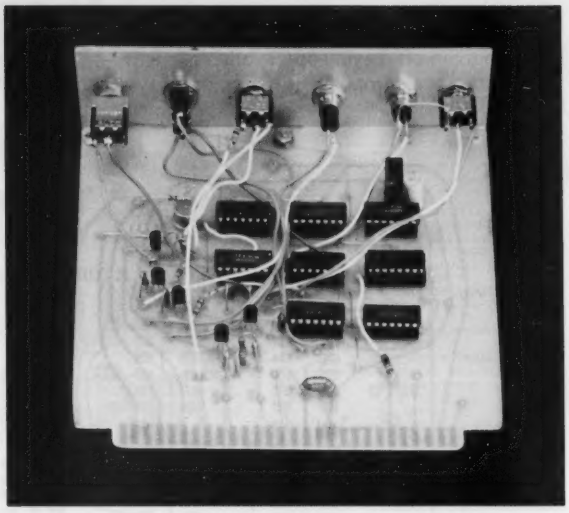

Photo B. Controller built on plug-in card.

U5A at this point goes high through pin 11. This line sets U7B through pin 8, causing pin 12 of U7B to go low. This logic is sent to pin 6 on U5C. Pin 5 is normally set low (we'll get back to it in a moment), with the result that the output of U5C, pin 4, goes high and keys the transmitter through relay driver Q5. When the input signal is released, pin 2 of U4 is set low via NOR gate U5B and after 2.5–3 seconds, pin 11 goes high, resetting U7B through pin 10. This is the squelch-tail circuit. If no further activity is detected after 10–12 seconds, pin 5 of U4 goes high and resets U7A through pin 10. The delay line is back on and ready for the next user(s).

This may seem like a fair amount of work just to kerchunk the old machine, but you'll always get a consistent squelch tail, each time and every time. You turn on

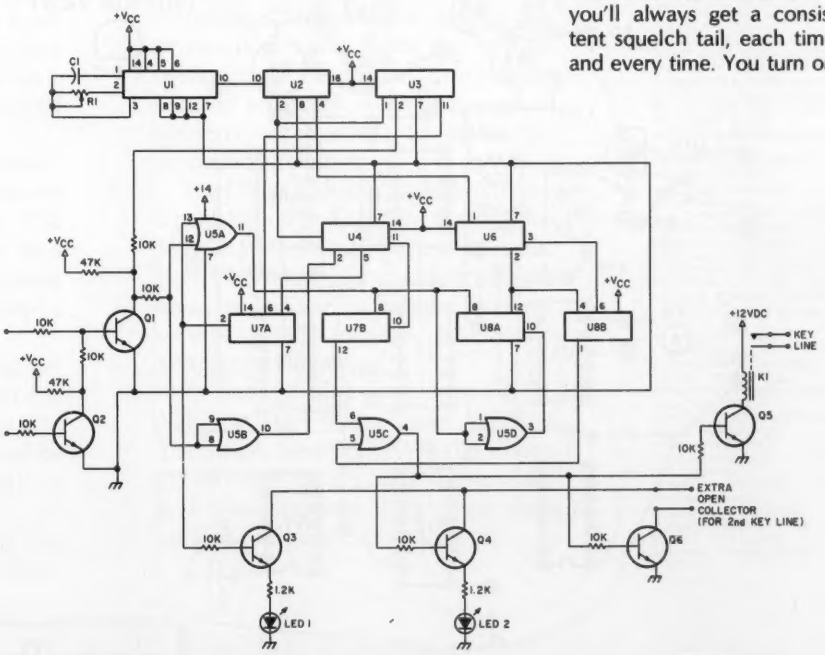

Fig. 1. Schematic.

the various flip-flops and the on-board clock, and counters turn them off, keying the transmitter and dropping it in the process. No noise spikes to fool one-shots, no variable-length tails, timeouts, or delays. Sound good?

Read on! Now you'll find out why I sent you through all those gates and flip-flops. Refer to pin 5 of U5C, the key-line driver. By using a NOR gate here, we've incorporated timeout control, merely by driving pin 5 high. Stops 'em every time! This is easily done by using two more flip-flops—U8A and B.

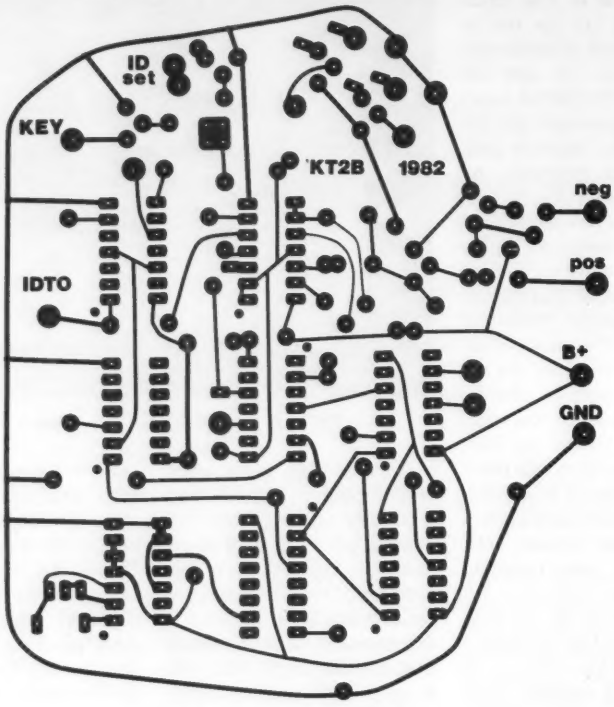

Fig. 2. Printed circuit board.

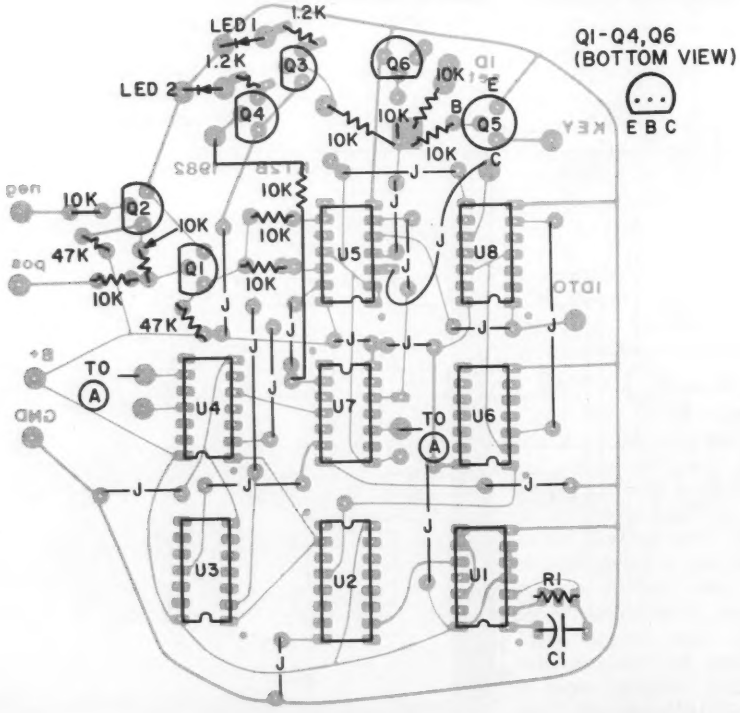

Fig. 3. Component layout.

Let's assume someone has brought up the repeater and is chewing everyone's ear off describing the new Ultra-5000 computerized rig. Remember the COR set conditions: U3 is enabled, U4 is disabled, and U7A and B are in the set mode. Refer again to the schematic and you'll spot U6, another divide-by-seven counter. When pin 11 of U5A goes high, it sets pin 2 of U6 low, enabling the counter. U6 derives its clock pulses from pin 4 of U2 for determining the timeout interval. The Split Rock repeater always had about a 90-second timer, so this program was retained.

As long as pin 2 of U6 is held low, which it is whenever there is activity on the receiver, it will continue to count up to 90 seconds, at which point pin 3 of U6 goes high and sets U8B through pin 6. Pin 1 of U8B then goes high and is sent to—you guessed it—pin 5 of U5C. Pin 4 of U5C goes low and the key line is dropped, shutting off the repeater.

When our hero runs out of superlatives on his new toy and drops the input carrier, several things happen. First, U3 and U6 are immediately reset. U4 is now enabled and its pin 11 goes high, resetting U8A and setting pin 12 high. Like a stack of falling dominoes, this resets U8B, which then resets pin 5 of U5C low, and we're back on the air. You'll get the customary squelch tail, and that's it! Everything is ready for another timeout.

The timeout timer can be reset immediately upon the dropping of each input carrier by using pin 11 of U4, or, if you prefer a short interval for the "beep," pin 9. This will give about a 1–1.5-second interval for reset. The

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TELEGRAPHY ABBREVIATIONS
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SKY WAVE AND SKIP
GROUND WAVE
HARMONIC INTERFERENCE
SWR READINGS
SIGNALS AND EMISSIONS
BACKWAVE
KEY CLICKS-CHIRPS
SUPERIMPOSED HUM
SPURIOUS EMISSIONS
COMPUTERS
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CIRCUIT COMPONENTS
PRACTICAL CIRCUITS
SIGNALS AND EMISSIONS
RADIO WAVE PROPAGATION
EMERGENCY COMMUNICATIONS
TRANSMITTER POWER LIMITS
STATION-ID REQUIREMENTS
THIRD-PARTY PARTICIPATION
FREQUENCY BANDS
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MAXIMUM USEABLE FREQUENCY
IONOSPHERIC DISTURBANCES
SUNSPOTS
SCATTER, DUCTING
LINE-OF-SIGHT
TROPOSPHERIC BENDING
SAFETY PRECAUTIONS
TRANSMITTER PERFORMANCE
TWO-TONE TEST
NEUTRALIZING AMPLIFIERS
POWER MEASUREMENT
TEST EQUIPMENT
OSCILLOSCOPES
MULTIMETERS
SIGNAL GENERATORS
SIGNAL TRACERS
AUDIO RECTIFICATION
REFLECTOMETERS - SWR
SPEECH PROCESSORS
ANTENNA-TUNING UNITS
S-METERS
WATTMETERS
IMPEDANCE
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REACTANCE
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high-going pulse from pin 9 can be used to activate a beeper, if needed. The time-out program can be changed to the legal limit of 180 seconds by taking clock pulses from pin 13 of U2 and sending them to pin 1 of U6.

That's all there is to it! The addition of a couple of LEDs to indicate DELAY and COR status puts you in business. Photo A shows a completed board minus LEDs, while Photo B shows one version built on a WESCOMM 56-pin plug-in card which SARA uses on K2RF/R. Two built-up boards are now in existence, which means anytime there's a failure, on-site maintenance consists of pulling the bad board and plugging in a new one. The defective unit can be repaired at your leisure in a nice warm place, not some icebox on a hilltop. Photo C shows the difference in size between the old controller and the new version. Fig. 2 shows the circuit board used, and Fig. 3 shows the component layout. If there is sufficient interest, high-quality printed circuit boards will be made available.

One final suggestion: Use good chips. You're trusting the control of your machine to this little bugger, and seconds or grab-bag ICs just won't hack it. A good source for chips would be Jameco Electronics.[2] If you aren't sure if it'll work under harsh conditions, do what I did: Place the board in a plastic bag and toss it in the freezer for about two hours, then pull it out, plug it in, and get the good (or bad) news. Prime chips should handle this test with no sweat.

There is no place to attach the relay to the circuit board since every relay is different. So, do what I've done and glue your relay right to the board on its side—there's plenty of room. Don't forget to bypass the coil with a diode or you may have some problems with spikes.

It's not a whiz-bang micro-based control with 3,000 functions, but on the other hand, you ought to be able to build one of these for under $25.00 with all new parts, and that's a worst-case guess. This unit is ideal for hard-to-get-at locations or for remote links. You can add any type of ID circuit you like; just use the output of pin 11 of U5A to trigger it, through an appropriate transistor.

Have fun! If any questions arise in construction, send along the usual SASE and I'll try to help. ■

References

1. "A CMOS Control Circuit for Repeaters," Donald Dorson W1GBO, *QST*, March, 1979.
2. Jameco Electronics, 1355 Shoreway Road, Belmont CA 94002.

Parts List

U1	CD4047BE mono/astable multivibrator	$.89
U2	CD4040BE 12-stage binary/ripple counter	.79
U3, U4, U6	CD4024BE 7-stage binary counter	2.07
U5	CD4001BE quad 2-input NOR gate	.29
U7, U8	CD4013BE dual-D flip-flop	.78
Q1, Q2, Q3, Q4	2N3904 NPN transistor	1.00
R1	500k linear taper control (63P-500k)	1.10
C1	Mylar™ .022-uF 100-V capacitor	.13
Q5	2N3566/2N2219 NPN transistor	.50
R2, R3	47k, ¼-Watt carbon resistors, 5%	.12
R4-R13	10k, ¼-Watt carbon resistors, 5%	.60
R14, R15	1.2k, ¼-Watt carbon resistors, 5%	.12
D1, D2	Red LED, #XC556R	.69
7 ST	14-pin solder-tail IC sockets	2.03
1 ST	16-pin solder-tail IC sockets	.34
Total Parts		$11.45

Note: All prices are from the recent Jameco catalog.

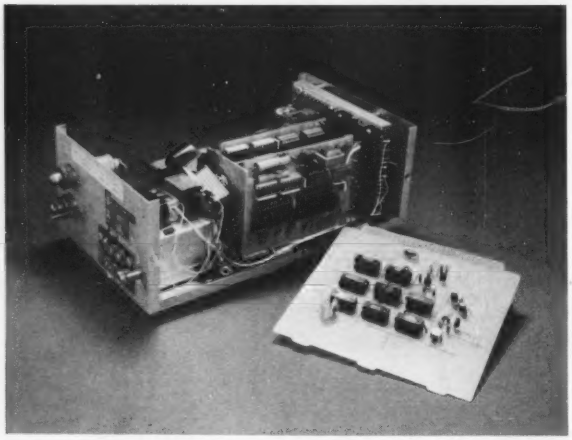

Photo C. Size comparison of the old and new controller versions.

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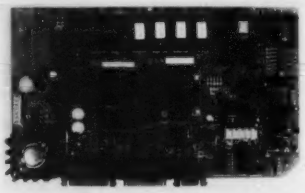

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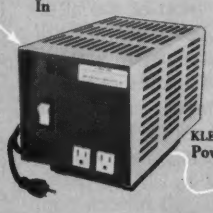

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Not-So-Famous Garriott Words

In one of his first post-STS-9 appearances, W5LFL spoke at Foothill (CA) College. We record his dedication to amateur radio.

Last February, Dr. Owen Garriott W5LFL described his historic space-shuttle operations in a speech given to over a hundred hams at Foothill College in Los Altos Hills, California. Owen was in the Bay Area to address engineering faculty and students at Stanford University, his alma mater. His appearance at Foothill was arranged by Ted Harris N6IIU, Disaster Services Director for the Palo Alto (California) Red Cross.

Before Owen spoke, college trustee Robert Smithwick W6JZU noted how appropriate it was that the first ham to operate from space should address a group at Foothill, because the college was the original home base for Project OSCAR. Dr. Smithwick also reminisced about the beginning of the space age in October of 1957.

The following is an edited transcript of Dr. Garriott's talk.

Smitty mentioned the events that occurred October 4, 1957. I well remember where I was on that evening. I was a graduate student here at Stanford University, just in the process of looking for some interesting dissertation subject, when all of a sudden the Russians were kind enough to provide the ideal opportunity with this beeping satellite putting out its beeps on 20 and 40 MHz.

On that Friday evening, we went out to the radio-propagation field site (along with a good many other hams) and listened to the sputnik beep its way around the Earth, all of us of course amazed.

The field site was pretty well equipped: We had a number of chart recorders and different kinds of antennas there because the field site at that time was being used for studies of propagation effects. Therefore, we could connect up the output of the Collins receivers to the chart recorders and look at the amplitude and also the very interesting fading pattern, which of course was quite different than any kind of fading that had ever been observed on normal 20-MHz propagation paths.

I can remember the question being asked, "Well, that's puzzling: Why is that fading coming along here at something like a one- or half-a-Hertz rate?" The person who asked was Professor Ron Bracewell, and I suspect he knew the answer to the question at the time he asked. But the question was asked to get us graduate students thinking about it.

Well, that fading, as you all probably already know, turned out to be the Faraday rotation of the satellite signals. As a signal travels down, as it propagates through the ionosphere, its polarization is rotated and that produces the fading pattern which we see on the ground. It was very fortunate for me, as that turned into a dissertation topic in the next year or so.

So I very well remember what happened that October, and it certainly was a very exciting time, that evening as well as for the next year or two, as we began to understand something more about how radio signals propagate through the ionosphere.

Spacelab Constraints

Well, we could go on with some of the historical stuff, I think, for most of the afternoon. There's an awful lot of interest associated with it. But let me talk about events of more recent history, like in the last couple of months. That is, specifically, what we were able to do on Spacelab.

We were on duty for 12 hours a day, and my ham activities were very carefully constrained to make sure that they did not interfere with any of our basic mission objectives. I had a list of 12 items which could not be violated in terms of the ham operations, including such constraints as no more than an hour a day, never when I was on duty, and all these kinds of things. And as a matter of fact, there was no infringement of the main objectives of the flight. We did accomplish all of the scientific activities that we were scheduled to do—and more, in many cases—and I still managed to find a little bit of time for the ham activities in the off-duty periods.

STS-9 Equipment

Now, some of you have perhaps already gotten the February *QST*, so you've seen a picture of the little hand-held transceiver that was used for the in-flight communications. I'll just mention a little bit about some of its characteristics. It was essentially a Motorola design, but it was built by individual Motorola employees during their off-duty time. It may have been a little bit modified from their standard design; I don't really know.

The radiated power was only 4 Watts, but in spite of that, the signal-to-noise calculations showed very good margins. I know the people here at San Jose City College had perhaps as good a calibration as any, and I think your numbers were something like 40 to 43 dB signal-to-noise ratio. And certainly when we were in an attitude in which the antenna was pointed toward the Earth, people could hear from horizon to horizon with an excellent signal-to-noise ratio.

The antenna that we used was also built by hams, these at the Johnson Space Center Amateur Radio Club. It was their own design. It was essentially a single split ring, and then the feedpoint was adjusted around that

split ring until the impedance was matched to the 50-Ohm coax. The measured swr before the flight was 1.2 or 1.3, something like that—really quite good.

The antenna was mounted in a little dish about five or six inches deep and put in the overhead window in the aft flight-deck area, right behind the cockpit area. It worked extremely well. I don't know what the real swr in flight was—I didn't have a meter—but it must have been very close to what we had measured prior to flight on the ground, because the performance as near as we could tell was absolutely nominal and gave very good results.

I had to take the antenna down after every operation, because it really filled up one of these overhead windows and the other crew members preferred to have the opportunity to look out instead of at the back of this metal dish. And so, after each pass on which I was using it, I took it down and sort of taped it over to a side wall where it was out of the way. And then I just took a few minutes to put it right back up in the overhead window again when the next opportunity came along.

U. S. Passes

We had publicized, as I expect most of you know, what the most favorable opportunities would be. We indicated that not all of those listed would be possible in flight, and that's the way it turned out. But still, most of my operations were among those that were listed in the pre-flight forecasts.

We got an extra day extended to the flight, and of course we had no predictions for those, but a lot of the good hamming opportunities came in just the last two or three days of the mission. By that time, I think people pretty well knew how to use the orbital elements that were transmitted by the ARRL, and I suspect most of you knew pretty well when the spacecraft would be coming over, because certainly it sounded as though there were plenty of people on the ground who knew when to transmit.

Dr. Owen Garriott W5LFL speaks at Foothill College about his STS-9 amateur-radio activities. (Photo by Jim Koski KT6W)

One of the most interesting passes came right down across the Mississippi Valley on either the last or next-to-last day in orbit. I've had reports from people on both the east and west coasts who were able to hear those transmissions. In this case, the antenna was pointed right down toward the Earth, and signals were received well beyond the actual geometric horizon. Probably some refraction in the ionosphere, a little bit of refraction around the limb of the Earth, would account for the fact that the signals were really heard over a substantially larger distance than a geometric straight-line path.

It also turned out that even when the antenna was pointed toward the sky, there was enough of a side lobe around the edges of the vehicle that some transmissions could be heard on the ground, and vice versa, although of course signal levels were very much lower than when the antenna was pointed in an optimal direction.

Special QSOs

A number of special contacts were established. For example, I talked with my home ham club in Enid, Oklahoma, W5 Hot Tea Kettle, where I started when I was a teenager. My mother was at the shack, so I had a few moments to exchange a greeting with her. And on the same pass, headed toward the southwest, we passed over the Johnson Space Center where my sons were at the local ham club. So it provided an opportunity to exchange a few words with them.

I think most everyone knows that Senator Barry Goldwater has been very important to our ham activities by supporting ham interests in Congress. I had a special opportunity to talk with him for a few seconds passing down the east coast. And also, very fortunately, I talked with W1AW. They were competing right along with everybody else and managed to show up on one of the published frequencies.

King Hussein was another interesting brief conversation. Of course, there's not a lot of competing activity flying over the Near East, so I didn't have too much trouble having a very nice brief conversation with him.

Shuttle Communications

One final contact I want to mention came when we were flying over Australia. One of our astronaut personnel, Dr. Joe Kerwin, is on assignment in Australia near the NASA tracking station at Canberra. We talked with the hams there, and they went out and set up a fairly high-gain antenna at one of their tracking locations—it's still ham gear, however—and I prearranged a time and frequency to meet with them.

We had it arranged that I'd set up the communication via the ham link, but then they would patch me in via their federally-leased telephone lines back to the capcom [capsule communicator] in Houston. So I talked to Joe briefly and to all the hams at that station, and then they patched me in to the federal line and I talked to the capcom, who was communicating with the spacecraft via the normal channels from the control center in Houston. And the quality of that transmission was better than the normal Ku-band transmissions. It very much impressed the other members of the flight crew and the flight commander, John Young.

John is also the head of the Astronaut Office, and I think there really is a genuine interest in the possibility of having something like this available for a backup communications mode in the future. Whether or not anything develops from that, I don't know. But I think his interest is significant, and others in the NASA administration have also mentioned that to me.

Advantages of 2 Meters

I think 2 meters was a good choice for the operation. Some people have asked me since, "Well, shouldn't we go to higher frequencies?" or "Shouldn't we go down to HF and look for more interesting propagation effects?" All those things are interesting to think about, and we might want to consider something different on another occa-

sion. But for this first opportunity, I think 2 meters was exactly the right choice.

First of all, the Doppler shifts are about plus-or-minus 3.5 kHz, and if you can imagine using anything other than an FM receiver —say, single sideband— you'd be continually trying to track and take out that Doppler shift, both on board and on the ground. It would be a terrible job. With all the hundreds of signals being received and everybody having different Doppler shifts, it would be a hopeless task. Working with an FM discriminator, of course, any place you operate along the passband of the center part of that discriminator circuit, it'll take out the Doppler shift for you. So that was an enormous advantage immediately.

And the second thing about an FM circuit is that it also tends to select the strongest signal and suppress the others. That was also extremely important from the practical standpoint of trying to pick out one or two stations from maybe a hundred that were calling on each of the uplink frequencies. So the FM transceiver at 2 meters was really an ideal choice for this first effort.

Future Changes

All in all, it's just hard to imagine how we might have done things much differently, although I do want to make a couple of points about that.

First, you'll see in that picture on *QST* that I was operating with a very lightweight headset, just a little single bar over my head with one earpiece and a little sponge underneath that. This was designed for working in the spacecraft, so that I could hear all the other things going on around me. That was important for using it in a spacecraft environment for other purposes, but it was a difficulty in working with ham equipment. There was too much outside noise. What I really needed was a pair of good headphones that would really isolate me from the outside world.

And then, the only really serious thing, there was no variable adjustment on the squelch circuit in the transceiver. And the squelch circuit operated such that it compared the signal at the center of the band with what it interpreted to be noise coming in from the outer edges of the passband. Well, with plus-or-minus 3.5 kHz, all these other signals coming in provided what the receiver thought was a lot of extra noise in the fringes of the passband. Therefore, it would often decide, "Well, the signal isn't stronger than the sideband noise, therefore I'll turn on the squelch, because it's not a strong signal." And that way, the whole receiver would be deadened, whereas really I had plenty of good signals there, but no opportunity to inhibit the squelch. So that is the one design feature that I'm sure we would change the next time around.

Mission Successful

Outside of that, things went really beyond our expectations. Every objective we set before the flight was achieved during the time I was able to operate. I was on the air for something like four or five hours total, and during that interval, something like 350 two-way contacts were established. And the ARRL has about ten thousand requests for SWL reports. So it was really very widely participated in by both hams and SWLs. It was a marvelous opportunity and a great pleasure for me to have had this chance to operate from space. And I'm just sorry I'm couldn't have had a two-way with every one of you who tried to contact me. ■

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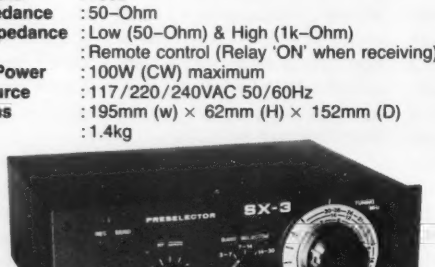

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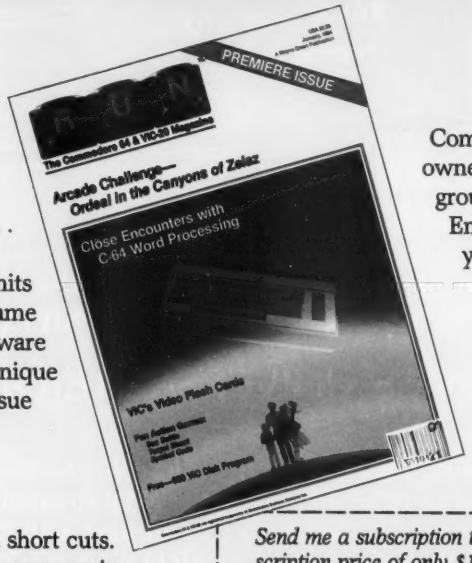

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Being an avid SWBC DXer, I have read with interest in many publications the consistently favorable reviews given to the new Icom R-70 HF receiver. I have been SWBC DXing for a period of time using a high-quality portable receiver, but I finally reached the point where I needed to upgrade to another level to snatch some of the weaker stations I sought. With this idea in mind, I recently purchased an IC R-70 and have been having a ball ever since.

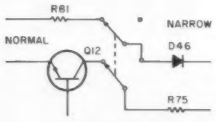


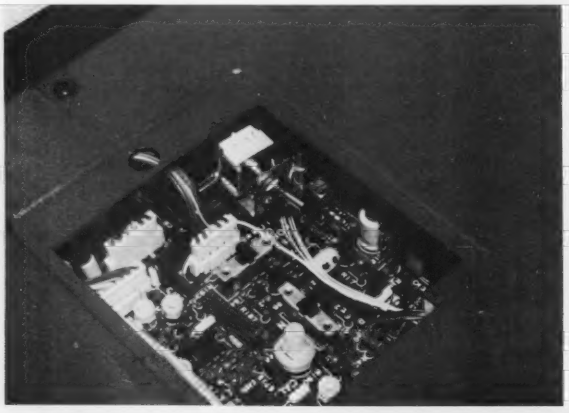
Fig. 1.

In the AM mode of operation, the passband tuning allows the passband to be varied from 6 kHz to 2.7 kHz. In the SSB mode, the passband can be varied from 2.3 kHz to 500 Hz. This is indeed sufficient for many applications, yet it seems that many of the rarer DX stations that I sought were sandwiched between two or more powerhouse SWBC stations at ± 5 kHz. Needless to say, the resultant cochannel interference would many times render my desired station unintelligible, in spite of the passband tuning.

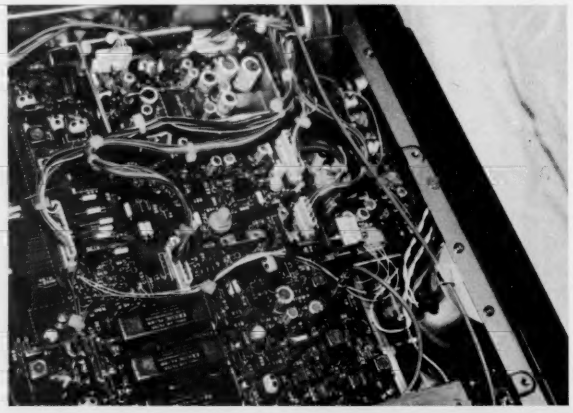
It was at this point that I pulled out the schematic diagram and began investigating the possibility of switching in the narrower-bandwidth ceramic SSB filter instead of the standard ceramic AM filter.

The steps that follow will

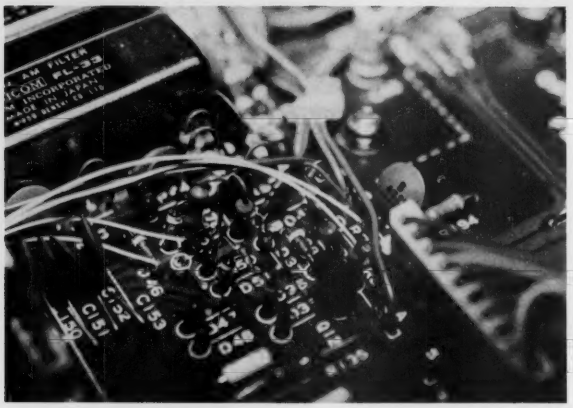
Photos by D. A. Carlson



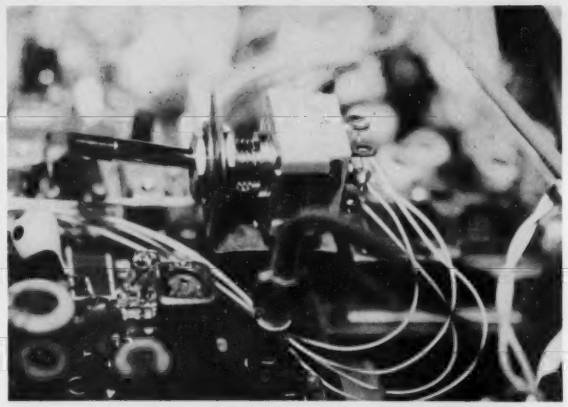
Completed conversion. The switch may be accessed with ease through the top trapdoor.



Routing of wires from the switch to their respective connection points.



Wires connected as per schematic diagram.



Mounting bracket formed from a bent spring clip.

describe the modification of the Icom R-70. At the 3rd i-f of 455 kHz, the SSB filter of 2.3 kHz will be switch-selectable to replace the standard AM 6-kHz filter. While this cut down on the fidelity of music and some voice transmissions, in many cases it dramatically reduced the co-channel interference problem. It allowed me to pull more than a few signals out of the mud. Physically, no components are removed and nothing is done to the receiver that cannot be reversed.

The parts and tools required are:

- 1 DPDT toggle switch (small)—ALCO MTB206N or equivalent
- 2 feet of hook-up wire (20-24 gauge)
- Solder sucker or solder wick
- Needle-nose pliers
- Side cutters and wire strippers
- Phillips screwdriver
- Soldering iron and solder
- Schematic diagram
- Parts layout diagram

1. Remove the 12 screws that attach the top cover to the chassis of the receiver and lift the cover off.

2. Remove the 7 screws that hold the main circuit board in place and lift up the main circuit board. The wiring harnesses connected to the circuit board do not have to be removed.

3. With the parts layout diagram and schematic diagram, locate R81, R75, D46, and Q12 on the main circuit board.

4. Using the solder sucker or solder wick and needle-nose pliers, lift the end of R81 that is soldered into the same foil track that holds the anode of D46.

5. As in step 4, lift the end of R75 that is soldered into the same foil track that holds the collector of Q12.

6. Cut 4 6-inch pieces of hook-up wire. Solder wires to the following points:
(a) the free end of R81
(b) the free end of R75
(c) the hole that formerly held the end of R75
(d) the anode of D46

7. These 4 wires will be soldered to the DPDT switch as shown in Fig. 1. The wires should be routed and dressed neatly to where you elect to mount the switch. The photos will demonstrate one possibility.

I mounted my switch to one of the screws that hold the main circuit board into place. A bracket was formed from a spring clip bent to 90 degrees, a 1/4-inch stand-off spacer, and a long bolt with lock washers. This held everything to the main circuit board and chassis (see photos). Use your imagination on this one and see what you can come up with from your junk box. I am able to access the switch with ease through the trapdoor in the top cover.

In one position, the circuit is in its normal configuration. In the other position, the SSB filter is substituted for the AM filter to greatly improve selectivity. It must be kept in mind that this conversion affects the AM mode only. The switch must be returned to the normal position when other modes are used although no harm will occur if the switch is mistakenly left in the "narrow" position.

This option has proven invaluable on a number of occasions and improves on what is already an exceptional receiver. ■

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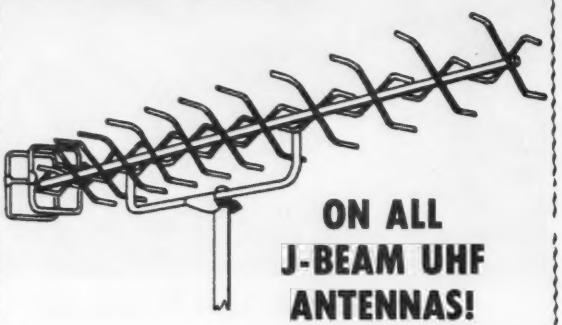

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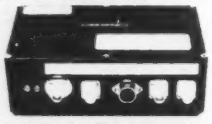

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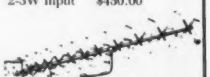

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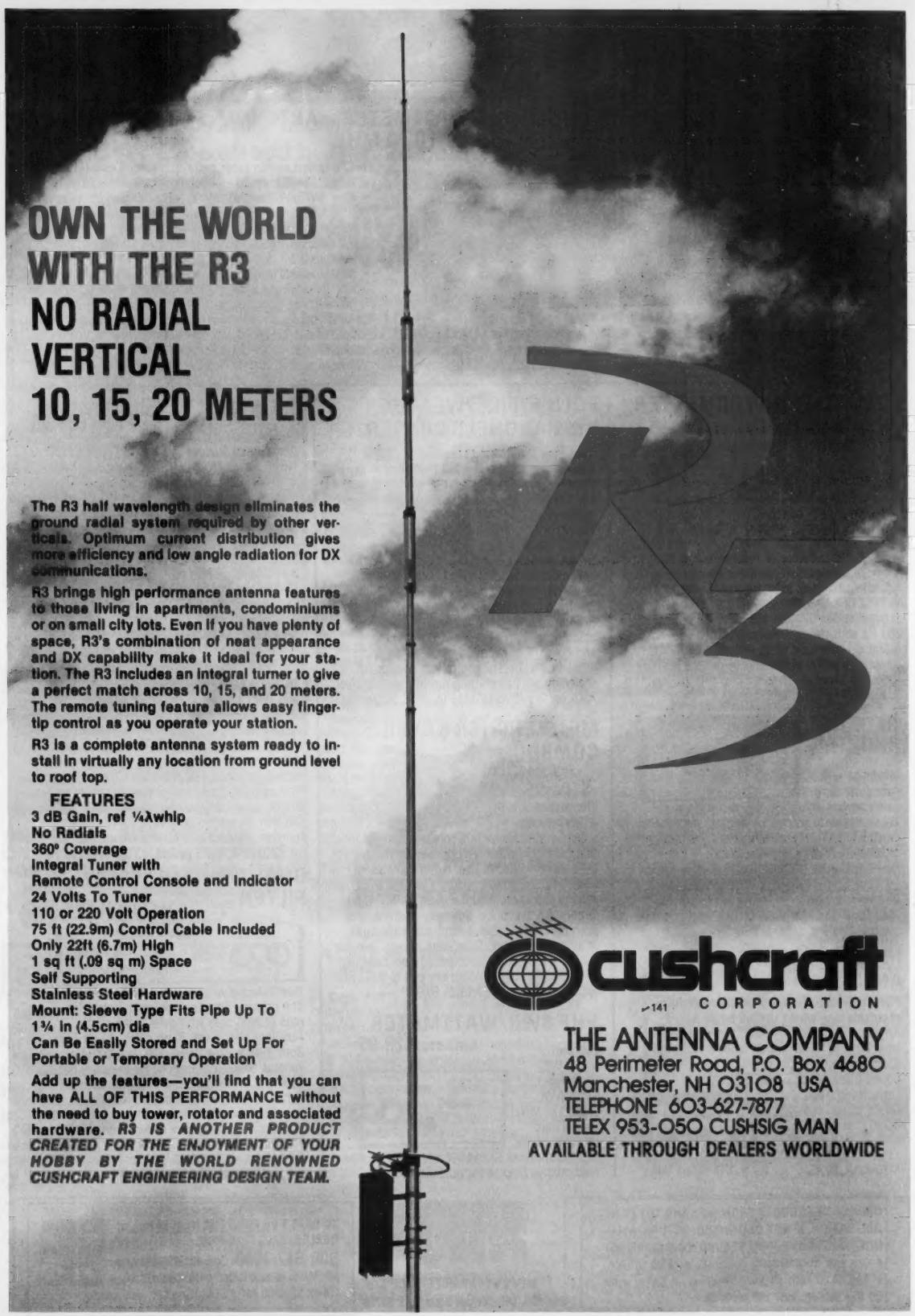

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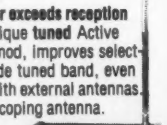

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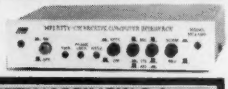

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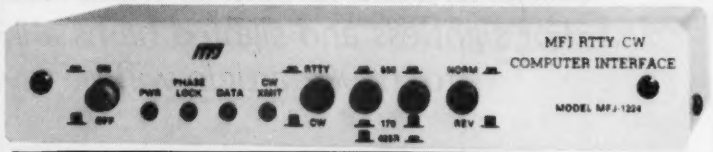

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Copies on both mark and space, not mark only or space only, to improve copy under adverse conditions.

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L. B. Cebik W4RNL
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A simple and elegant solution to setting beam headings for both blind and sighted hams is the K9AZG automatic beam aimer (*73*, November, 1982). With a few voltage comparators, transistors, and relays (plus the usual passive and power-supply components), the device controls CDE and similar rotator control boxes so that by setting a single potentiometer, the operator can step back and relax as the beam turns to the desired heading and stops. Sightless hams now have an easy way to determine beam headings reliably, while the sighted ham can use the beam-turning time for tune-up, logging, and other activities.

The original automatic beam aimer used two sections of an LM339 quad voltage comparator to detect the desired change of direction, as shown in Fig. 1. (Fig. 1 is redrawn from the original to show the individual comparators.) Each comparator controls a transistor switch and relay which in turn control the clockwise and counterclockwise switches of the CDE box. Like any good idea, we can improve upon the original and overcome some potential problems. This article describes some improvements which will prevent a few problems that some CDE rotator owners may encounter with the original design.

The Basic Idea

The basic idea behind the

Photo A. The completed beam aimer sits atop the rotator control box at the W4RNL operating position. The ac switch and power LED are to the left and the clockwise and counterclockwise LEDs are to the right. The center knob is the direction control prior to the addition of calibration markings.

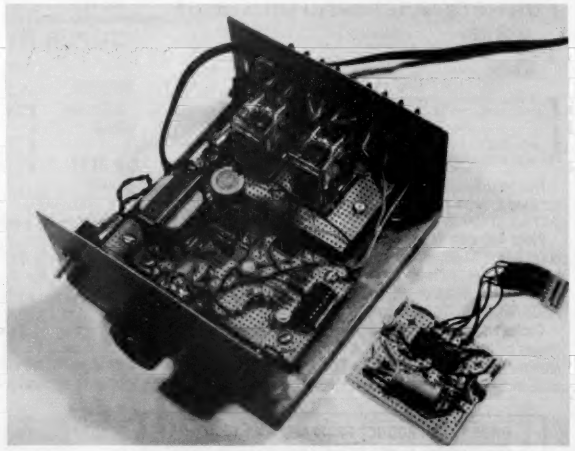

Photo B. An interior view of the quick-fixed beam aimer with the improvement board to the right. The front perfboard contains the power supply and circuitry, while the rear board contains the relays (only two needed for the CD-44).

automatic beam aimer appears in Fig. 2. The 500-Ohm potentiometer in the rotator head changes value with direction, standing at mid-scale when the beam points north and at one of the extremes as the beam points south. Fed by an ungrounded 13-volt supply, the rotating arm creates a ground, thus changing the voltage across the left and right legs of the pot as the beam moves. From extreme point A to center we get a negative voltage; from point B to center we get a positive voltage; and the absolute values of the two add up to 13 volts.

A second potentiometer across the rotator pot (say, about 25k) will read 13 volts across its extremes. More significant for beam aiming, the voltage between the moving arm and ground will be zero when the arm and the rotator pot arm are equal percentages away from the same extreme point. If the beam points north and the second pot is mid-scale, the voltage at the second pot arm will be zero. If we move the second pot counterclockwise, leaving the beam north, we will show a positive voltage. We get a negative voltage if the second pot arm is clockwise with respect to the beam heading. Together, these voltages allow us to turn on one of two relays that close in parallel to the CDE switches, thus activating the rotator. That is the function of the K9AZG circuit.

The maximum voltage that the comparators in Fig. 1 can see is either plus or minus 13 volts. When the antenna is counterclockwise south and we move the second pot arm clockwise to the other extreme, the arm shows −13 volts to ground. In the opposite condition, when the antenna is clockwise south and the pot is fully counterclockwise, the arm shows +13 volts. If both the antenna and the second pot

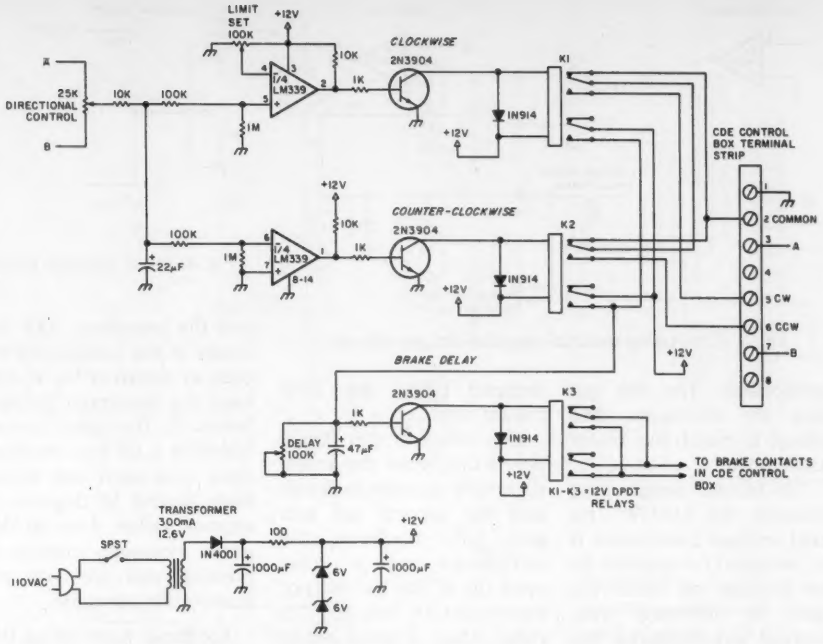

Fig. 1. The original K9AZG automatic beam aimer (redrawn).

are at either extreme, the pot arm ideally shows zero volts.

Design Limits and Quick Fixes

Unfortunately, only sometimes can we achieve the ideal conditions noted above. There are two design limits to the original beam aimer that may present problems to some hams. First, the CDE rotators have limit switches to shut off either clockwise or counterclockwise rotation at the south heading. Among other functions, the limit switches serve to keep us from wrapping antenna cables like vines around the rotator and mast stub. The limit switches may leave some residual voltage at either end of the scale. Imagine that the limit switches cut off the rotator at positions X and Y in Fig. 2. If the second pot is at its extreme, some small voltage will exist and the relay will not open. K9AZG counters this at one end of the scale with a calibration pot, but the other end of the scale goes to ground.

The quick fix for this

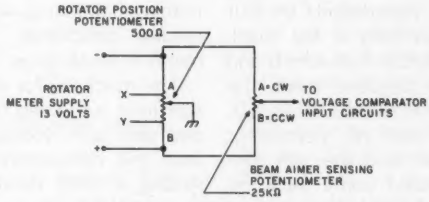

Fig. 2. The basic elements of beam aiming.

problem is the substitution of a low negative-voltage circuit to replace the ground connection of pin 7 of the LM339. Fig. 3 shows a suitable circuit using minimal

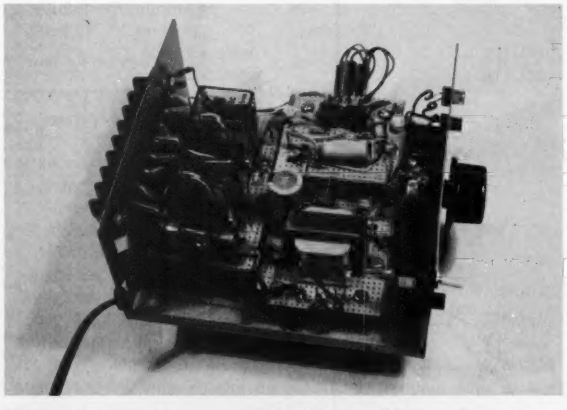

Photo C. An interior view of the improved beam aimer shown from the opposite side of the case. The new input board stands on half-inch pillars over the LM339 socket and transistors. The feedthrough barrier strip for rotator-control-box connections is visible at the rear of the cabinet.

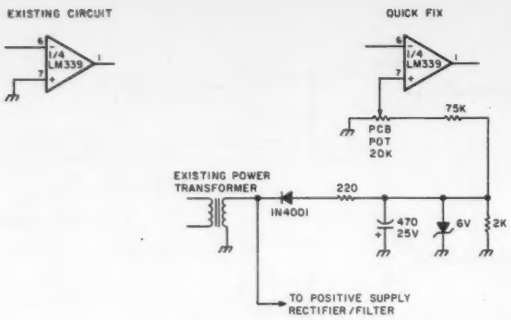

Fig. 3. Eliminating residual negative-voltage effects.

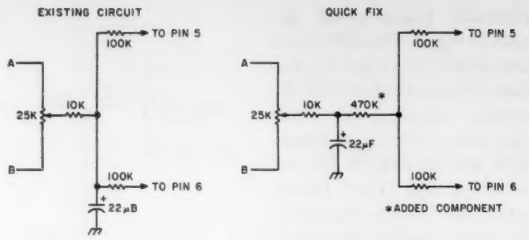

Fig. 4. Input changes to reduce excessive negative voltage.

components. The 20k pot trims the clockwise limit voltage to match the rotator cutoff point.

The second design limit concerns the LM339. This quad voltage comparator is not designed for negative input voltages on either the signal or reference lines. National Semiconductor limits its negative excursions to −0.3 volts in their rating sheets. Experiments on half a dozen 339s in the shack showed that between 6 and 8 volts negative input, the comparator would cut off. There was no permanent damage, and the 339 section would come back on when the negative voltage dropped below the limit toward zero.

The effect of this limitation is that when the antenna is fully counterclockwise and the second pot arm goes fully clockwise, the comparator and its relay open up as the second pot passes east (i.e., about −7.5 volts). Thus, a rapid excursion from southwest to southeast might result in nothing happening or might require directional adjustments in small steps.

The quick fix for this design limit is to keep the second pot arm voltage less than the comparator limit. Adding a 470k resistor between the 22-μF capacitor and the branching 100k resistors to the comparator inputs, as shown in Fig. 4, will keep the maximum voltage below 7. The beam aimer becomes a bit less sensitive since now each volt represents around 50 degrees of rotation rather than 28 degrees. However, control is positive, and precision remains quite adequate.

For those hams using the CD-44 and similar rotators, the third relay in the K9AZG design is unnecessary since there is no separate brake-solenoid circuit to control and no required delay between the direction switch and brake-switch release. To discover whether your rotator requires the third relay, check the rotator schematic in the operator's manual. If pin 2 in the rotator is not connected to a brake circuit, then the unit uses an automatically-engaging disc brake. For this class of rotator, the extra relay contacts in the clockwise and counterclockwise switch relays may be connected in parallel and used to control directly the "brake" switch, which actually is a master ac switch for the rotator. Use K9AZG's precautions of bringing the ac to a female socket on the CDE control box rear panel and then to the beam-aimer cabinet.

Fig. 5 shows all the modifications combined in a unit that works well with the CD-44 rotator. These quick fixes, however, are not the best possible design for the beam aimer.

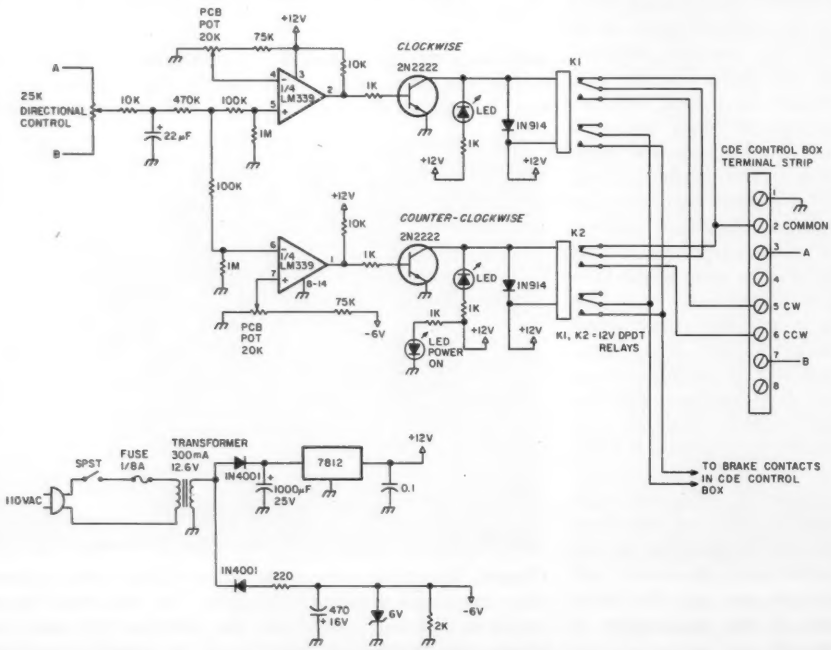

Fig. 5. A simplified beam aimer for the CD-44 and similar rotators.

Improving the Beam-Aimer Design

The automatic beam aimer can be more generally improved by a little redesign. Fig. 6 shows the full set of improvements. First, using LM311s with a dual supply from one 12-volt transformer is simple enough, and it provides for both positive and negative trimming of the voltage-comparator reference lines as well as permitting the 311 to accept a +13- to −13-volt excursion. The uncommitted collector of the 311 output allows for a zero-to-positive output swing to control the switching transistors. This design thus overcomes both limitations of the original.

Second, a slight redesign of the delay circuit for the brake control (which is

needed for larger rotators using brake solenoids) will overcome a further potential problem. The slow decay of the base voltage in the orginal brake-relay circuit can create contact chatter and possible arcing as the coil voltage drops in the transistor-collector circuit. Additionally, the transistor may draw an excessive load while the base voltage drops through the linear range toward cutoff. To create a very positive switching action, we need add only one more LM311, using it to set the delay. Its output switches rapidly, turning the transistor on and off with equal speed. In addition, we can add a variable delay to the 311 circuit and choose a value with the printed-circuit-board pot during initial adjustment.

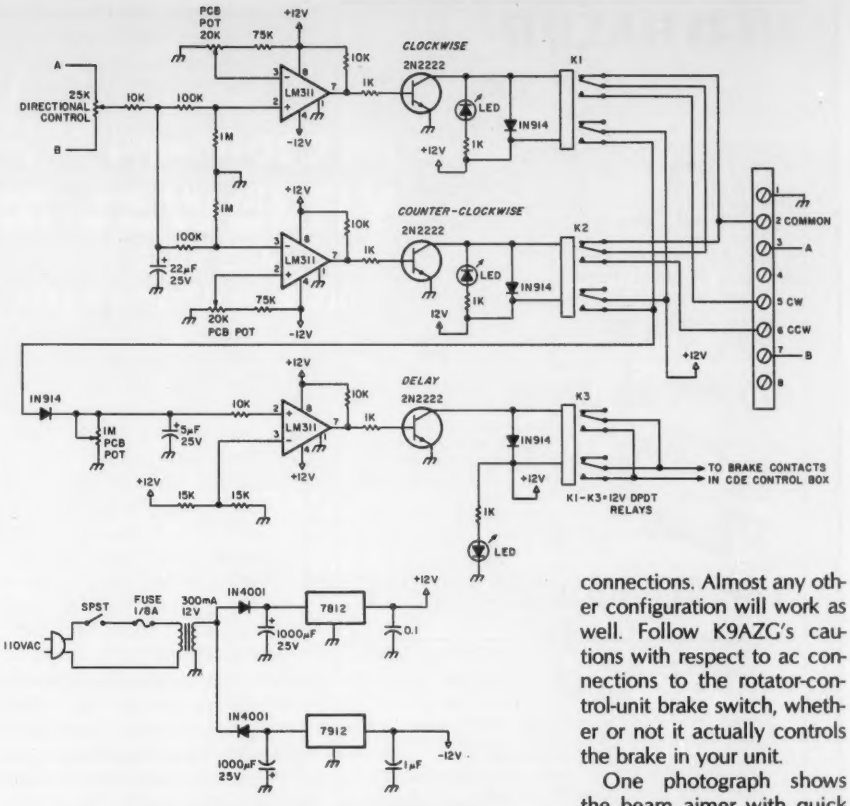

Fig. 6. An improved automatic-beam-aimer design.

Construction

Construction of the beam aimer in any version is straightforward and well covered by K9AZG. Perfboard works well for prototypes, although printed-circuit-board versions would make an excellent club project. The photos show the W4RNL layout. In both photographs, the rear board containing the relays for a CD-44 rotator is mounted a full inch above the case bottom to clear the socket pins. For the CD-44, the delay circuitry was omitted. The forward board containing the power supply and comparator circuit rests on half-inch pillars to ease front-panel connections. Almost any other configuration will work as well. Follow K9AZG's cautions with respect to ac connections to the rotator-control-unit brake switch, whether or not it actually controls the brake in your unit.

One photograph shows the beam aimer with quick fixes prior to modifications for the LM311 comparators. To one side of the LM339 board is the LM311 circuitry board which supplanted the quick-fix version of the aimer in the case. The new

Parts List

Part	Quantity Fig. 5	Quantity Fig. 6	Radio Shack Number
Transformer, 12 V, 300 mA	1	1	273-1385
Ac switch, SPST toggle	1	1	275-612
Fuse, 3AG, 1/8 to 1/4 A	1	1	170-1270
Fuse holder, clip-in	1	1	270-739
1N4001, 50-piv power diode	2	2	276-1101
7812 12-V regulator	1	1	276-1771
7912 – 12-V regulator		1	*
6-V zener diode, 1 W	1		276-561
1000-μF, 25-V electrolytic capacitor	1	2	272-1032
470-μF, 16-V electrolytic capacitor	1		272-1030
22-μF, 16-V electrolytic capacitor	1	1	272-1026
5-μF, 16-V electrolytic capacitor		1	272-1024
1-μF, 50-V tantalum capacitor	1	1	*
.1-μF, 50-V tantalum capacitor		1	*
LM339 quad comparator	1		276-1712
14-pin DIP socket	1		276-1999
LM311 voltage comparator		3	*
2N2222, NPN switching transistor, TO-92	2	3	276-1617
8-pin DIP socket	2	5	276-1995
1N914 silicon signal diodes	2	4	276-1620
LEDs, colors to suit	3	3	276-1622
Relay, 12-V, 75-mA coil, DPDT 3-A contacts, socket	2	3	275-206
Terminal strip, barrier or feedthrough, 8 contact	1	1	274-653
25-kilohm potentiometer, panel mount, and knob	1	1	*
20-kilohm PCB potentiometer	2	2	217-336
1-megohm PCB potentiometer		1	217-338
220-Ohm, 1/4-W resistor	1		
1-kilohm, 1/4-W resistor	5	6	
2-kilohm, 1/4-W resistor	1		
10-kilohm, 1/4-W resistor	3	5	
15-kilohm, 1/4-W resistor		2	
75-kilohm, 1/4-W resistor	2	2	
100-kilohm, 1/4-W resistor	2	2	
470-kilohm, 1/4-W resistor	1		
1-megohm, 1/4-W resistor	2	2	
Case, about 5″ wide, 6″ deep, 3″ high	1	1	270-253
Perfboard (cut from 4½″ by 6″, or make PCB)	1	1	276-1394

Miscellaneous wire, rotator cable, solder, terminal pins, ac cord, grommet, etc.

*Note: Parts not listed with R.S. numbers are available from DigiKey, Jameco, and other mail-order sources; or experiment with the nearest available value.

Total estimated cost with new parts: $25 to $35.

board contains its own negative regulator, replacing the low-voltage zener used in the quick-fix versions, as well as the 311 comparators and new input resistors. Removing the IC from the original version permitted easy substitution of the improved circuit. Except for a power lead to the negative supply and an input lead from the direction potentiometer, all other connections go through a DIP cable and plug into the vacated LM339 socket. As the second interior photo shows, the new board mounts above the 339 socket and transistors on half-inch pillars. The increased sensitivity to small knob rotations, with preservation of all of the quick-fix benefits, made the installation well worth the effort.

The mode of construction illustrated in the photographs resulted from continuing experimentation with the circuitry. I do not recommend it except as an example of how noncritical dc circuits are with respect to layout. Any convenient layout will do, including possible installations inside the CDE rotator cabinet.

These design improvements are slight overall but they may serve to keep a first-time builder from growing discouraged in the process of trying the automatic beam aimer. Without knowing where to look for clues, the source of anomalies can be frustrating. However, K9AZG's basic idea is both sound and elegant in its simplicity. So too were his motives. If you know a sightless ham who needs a better way to control his or her beam direction, follow K9AZG's lead and build a version of the automatic beam aimer. The satisfaction of helping a fellow ham get additional fun out of operating will more than repay the small investment in easily-available components. ■

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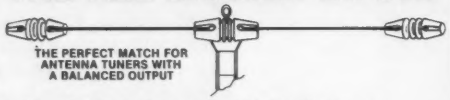

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D-80	80/75	130′	$31.95
D-40	40/15	66′	28.95
D-20	20	33′	27.95
D-15	15	22′	26.95
D-10	10	16′	25.95
Shortened dipoles			
SD-80	80/75	90′	35.95
SD-40	40	45′	33.95
Parallel dipoles			
PD-8010	80,40,20,10/15	130′	43.95
PD-4010	40,20,10/15	66′	37.95
PD-8040	80,40/15	130′	39.95
PD-4020	40,20/15	66′	33.95
Dipole shorteners — only, same as included in SD models			
S-80	80/75		$13.95/pr.
S-40	40		12.95/pr.

All antennas are complete with a HI-Q Balun, No. 14 antenna wire, insulators, 100′ nylon antenna support rope (SD models only 50′), rated for full legal power. Antennas may be used as an inverted V, and may also be used by MARS or SWLs.

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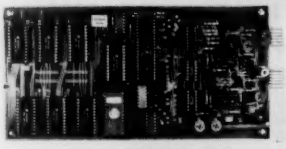

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(shown with 14K RAM and 8K ROM)

- Ready to operate—wired & tested —**LOW COST**
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- RS232 serial interface— 45 to 9600 baud
- Uses both ASCII and Baudot
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- Custom call sign option
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- Activates teletype motor to print messages
- Board accepts up to 14K of RAM
- Can be customized for **LANS** and up to 56K RAM

MODEL PK-1 wired & tested w/4K RAM	**$149.95**
Additional memory (up to 14K total)	10.00/2K
Manual only—credited with purchase (add $2.00 for shipping)	9.95
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Custom cabinet—includes installation of TNC, on/off switch, LED pwr indicator, reset button & pwr jack	24.95

Dimensions: 4.5 x 9.5 x 1.5 inches
Pwr required: +12 VDC, approx. 200 ma.

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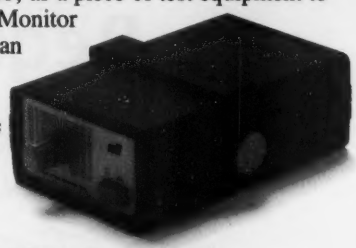

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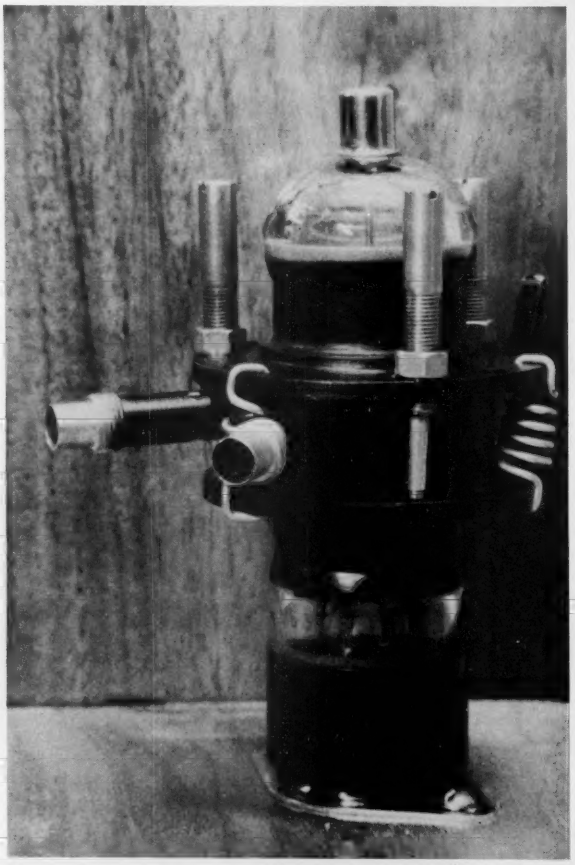
Requiem for the Tube

This pleasing project is perfect for pentodes. It could be the last time you use them.

Around the shacks of most amateurs, one easily can find numerous antique oddball electron tubes. Most of them are too small to be made into lamps and too large for a tie clasp. But still, you want to dig out of those shoe boxes those nostalgic reminders of the good old days and do something with them which is both functional and attractive. Combining the beauty of nature's wood with the glass and metal of

High-power pentode.



Klystron.

"Family scene."

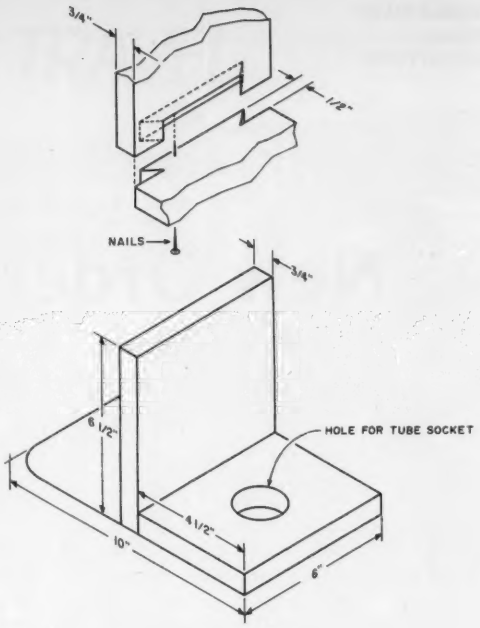


Fig. 1.

man in the form of bookends is a good example which should please even the most discerning XYL.

First, you need to visit your local lumber yard to purchase six-inch by one-inch-thick shelving. (Even though it is called 1", it measures only ¾" thick.) The material is then cut into two 6½" and two 4½" lengths. Then, using a bandsaw and chisel, a blind dovetail mortise is formed as shown in Fig. 1. Note that the dovetail is only ½" deep so that it doesn't even appear on the inside of the bookend. Each piece is then sanded, and holes are drilled for the tube sockets. The two pairs of wood pieces are then glued and nailed together before applying stain and varnish.

Next, a plate is attached to the bottom of the bookend using contact cement. This plate, which keeps the bookend from sliding, can be made of thin aluminum or wood veneer.

Finally, the tube sockets are screwed down into the drilled holes. For some large tubes such as the 4-400A variety, one might simply drill the 5 holes for the tube pins and then glue the tube in place.

There are several good candidates for old tubes: medium-power transmitting tubes such as the 4-125A, 1625, 807, and 24G; klystrons such as the 2K25, 2K26, and 417B, which look like miniature robots; lighthouse tubes such as the 2C39, 2C40, and 2C43; and acorn tubes such as the 954 through 959 series. A family scene of tubes with two plate caps was formed on one set of bookends using the RK-34 (father), 2C26 (mother), and HY75A or HY114-B (baby) tubes. ■

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New Orders for the R-109

Two bucks and ten minutes are all it takes to re-enlist a vintage receiver.

The R-108, R-109, and R-110 FM Army surplus receivers are readily available, very well constructed, and best of all, inexpensive. They are broadband FM sets covering 20 MHz to 55 MHz, depending on which set is used. These sets can be used with no conversion on 6- or 10-meter FM. They are fully tunable over their full range. I have had good results using them on various projects, including converting an R-109 to SSB for 10-meter use. The sets are very sensitive, using mostly one-volt filament tubes. All of the receivers I obtained came with a 24-volt plug-in power supply (PP-282) which draws about 4 Amps. This is an inconvenient voltage and current for mobile use or fixed operation when only 12 volts at low current is available.

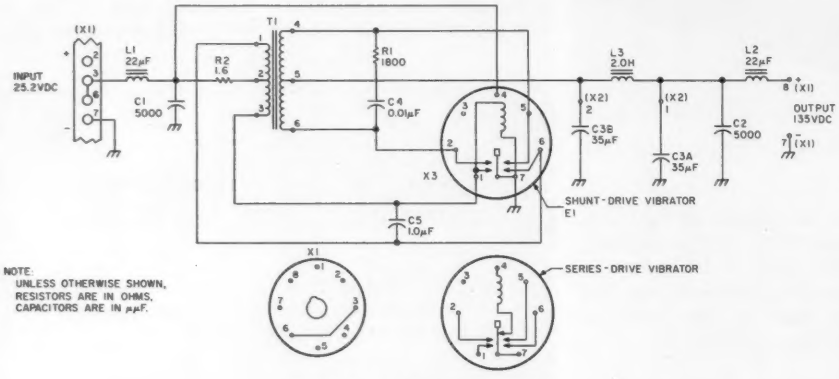

Fig. 1. Original power supply.

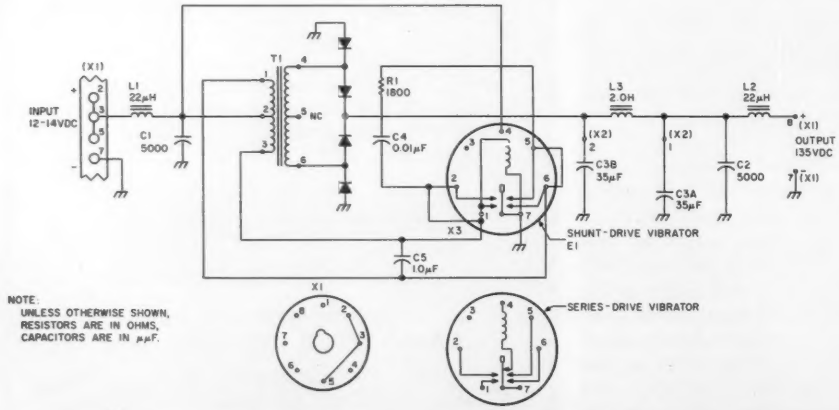

Fig. 2. Power supply modified for 12-14 volts dc.

Converting the 24-volt plug-in power supply to 12 volts is easy, quick, and inexpensive. The only part required is a Radio Shack 1-Amp, 400-volt bridge rectifier, catalog number 276–1173, at $1.89. This plus a little solder and wire is all that is needed. After the conversion, the unit draws only 1.5 Amps with 12-14 volts input.

Power supply PP-282 is located in the receiver as a plug-in unit. Remove the receiver from the case by turning the six hand screws 45 degrees, then pulling the receiver out. Loosen the three retaining screws, slide the retaining bar over, and pull out the supply by the wire handle. Remove four screws to gain access to the supply. Two are on the lower back and one each on the top and bottom of the front. The bottom plate is then removed and the upper cover pulled off.

Under-the-chassis changes are covered first. The components are conveniently marked—thank you, US Army. Check each step as you proceed.

1) Solder a wire across the

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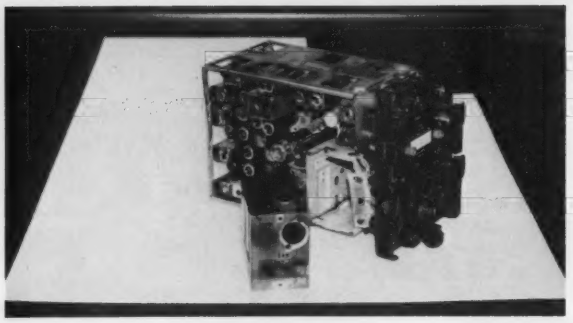
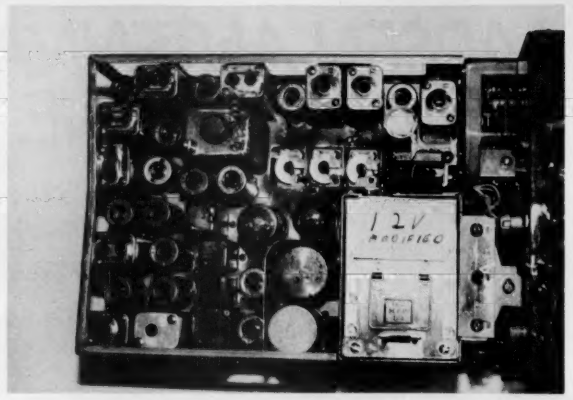


R-109 10-meter FM receiver with internal power supply PP-282.



Bottom view with the modified power supply in place.

large 1.6-Ohm resistor, R2, shorting it out of the circuit.

2) Disconnect the three wires (2 yellow, 1 red) from terminals 4, 5, and 6 of power transformer T1.

3) Solder the yellow wire formerly on pin 4 of T1 to pin 6 on vibrator socket X3.

4) Solder the yellow wire formerly on pin 6 of T1 to pin 1 on socket X3.

5) Solder the 1-Amp, 400-volt bridge wires marked ac to terminals 4 and 6 on T1.

6) Solder the wire on the rectifier marked − (negative) to ground, pin 7 of socket X3.

7) Solder the red wire formerly on pin 5 of T1 to the + (positive) wire of the rectifer.

8) Turn the supply over and make two changes to power plug X1.

9) Move the bare wire from pin 6 of X1 to pin 5 of X1.

10) Solder a wire from pin 3 of X1 to pin 2 of X1.

11) Reinstall the power-supply cover and base plate and plug the unit into the receiver; tighten the retaining bar screws.

12) In the receiver, be sure that switch S1 is in the 6/12/24-volt position.

13) On the outside of the receiver, install a jumper wire into the Receiver Control plug between pins J and H. Leave the insulation on the center of the jumper because 100 volts lives there.

14) Put the receiver back into the case and apply 12-14 volts dc plus to pin B, negative to ground, pin C, on the power plug. That completes the conversion to 12-14 volts dc. ■

Author's note: The power-supply conversion also works with the RT-70 6-meter FM transceiver.

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ARGENTINA

Alberto Silva LU1DZ
Grupo Argentino de CW
Carlos Dihel 2025
1854 Longchamps
Buenos Aires
Argentina

Carlos Vianna Carneiro PY1CC
Rua Afonso Pena, 49/701
20270 Rio de Janeiro
Brazil

THE LU3ZI SOUTH SHETLAND ISLANDS DXPEDITION

Pushed by the same marvelous impulse, the spirit of radio amateurs, the GACW (CW Argentine Group) sponsored the LU3ZI DXpedition to the South Shetland Islands, following the success of the previous LU7X (1979) and L8D/X (1982) expeditions to the States Islands for the *CQ* Worldwide CW Contest.

Aware of its responsibility, the GACW group operators for such DXpeditions are chosen from among the most reliable and skillful DX men in the group, and the splendid results in former and present DXpeditions show this to have been done, for operating capabilities, techniques, rules, and ethics were respected to the utmost.

An expedition to the Antarctic continent is extremely expensive, but the carefully planned project of Jorge F. Vrsalovich LU7XP was approved by the Direcion Nacional del Antarctico (Antarctic National Management), which rules all activities concerning the Antarctic continent in Argentina—the Instituto Antarctico Argentino (Argentine Antarctic Institute) in charge of all scientific investigations being one of its most important branches.

So, ultra-expensive transportation and logistical help were assured by the Argentine government; other problems were our responsibility!

Alberto LU1DZ started the job to get all that was missing: Oscar Rosity LU5DVO brought a rotator, Jorge Almoyraghi LU1EWL got a 3.5-kW generator from the Air Force, fuel and transportation to the docks were the job of Benjamin C. Cavallin LU9EMB, together with a second, 4.8-kW, generator. A 24-meter tower came from LU8DQ, a 3-element tribander Palombo beam was the contribution of Salvador Palombo LU3FG, and Carlos Rodriguez LU2DFX brought his own transceiver. Ronaldo Silva LU3EDZ checked and prepared the generators.

LU7XP, LU8DQ, and LU1DZ were to be the team, but almost-last-moment reasons stopped LU7XP and LU8DQ in Argentina. Ronaldo Silva LU3EDZ became the last-minute solution, and it now became a two-man team.

On board the ship, the *Bahia Paraiso*, Alberto and Ronaldo left Buenos Aires January 5, 1983, reaching Potter Cove on 25th of May Island eight days later, after a perfectly normal trip except for a storm in Drake's Passage which kept some in bed for 24 hours, seasick! From January 13 to 16, helicopters and boats landed all equipment to go to the scientific station, Teniente Jubany.

Ronaldo LU3EDZ, mechanics king, assembled generators, tower, and all during five long days of steady rain and snow and 40- to 60-kph winds with gusts to 90. A one-hour period was all the time Ronaldo could stand before getting shelter for rest again.

And then, at 1315Z January 16, CW on 20m, came the first contact, with W5RK, followed by CP7GM, LU9AX, and LU7XP. The first SSB QSO was with LU4US/mobile on January 28th, and then came LU2CM/mobile, LU1DBQ, LU4QD, and others.

During the seventh day of operation, after a 17-hour pileup, excessive earphone use caused Alberto LU1DZ trouble and fatigue, and the Teniente Jubany station physician had to stop CW operations for a while. Alberto then had a two-day SSB operation.

During a rest period, Daniel Vergani, chief botanist of the Mammalian Study Plan, took operators on a boat trip near Mariana Cove. The boat came upon four Jubarta whales, and Pablo Ljumberg, the diver managing the boat, happily got to not more than ten or fifteen meters from the whales. A possible emergency dive for all into frigid water was rather worrying!

An FT-101E transceiver and an FL-2100Z amplifier held up perfectly for the very hard 30-day operation, along with a Bencher key and an Autek manipulator with CMOS memory. SSB operations were great fun, too; discipline and respect for rules and ethics were perfectly obvious.

Lower bands, surprisingly, were very hard to operate, with QRN level close to S5, and S7 on 20 meters. This was true for weeks, which will give you an idea!

Openings to 3.5 and 7 MHz coincided with the best conditions on 14 MHz, so the question was: do a good job on the 20-meter band or try some problematic QSOs on lower bands? Conditions on 20 were good until 0430Z, but then transhorizon radar came on, S9 plus 40! From daybreak to afternoon, until 2000Z, bands were closed, with few openings to 10 and 15 meters. Only 5 good openings on 28 MHz to Europe and North America, not so good to Africa and west Asia. Funny, during two nights on 15 meters and close to 0400Z, we could QSO Asia but signals didn't even move the S-meter! On 20 meters, from 0900Z to 1100Z, Asia was worked with the beam to the west! From 0230Z to 0500Z, the antenna beamed west of America presented strong echo troubles; the same to Oceania. A Tahiti signal came 30 dB over 9 no matter where the antenna was beamed!

The helicopter moved all equipment between beach and ship.

On 20 meters, an open road could be found by looking for band noise; between 330° and 30°, noise showed possibilities; due south was absolute silence.

For Alberto, a 160-meter lover, the happiest moments were when the 57 stations in South America, Central America, North America, and Europe all QSO'd 160 meters!

During rest periods, an automatic beacon operated CW at 28277, 30 Watts, dipole antenna, for ionospheric observations. It was exciting to hear the LU1UG 5-Watt beacon, vertical antenna, 28255 kHz, back in General Pico City, province of La Pampa, 124 meters above sea level (a 12BY7 and EL86).

Exciting, too, was the visit of the *Williwaw*, Willy de Rose's (VK9XR/MM) 9-meter little yacht, a traveller of all seas. He lunched with Alberto but had to leave quickly—a storm coming.

During the 28-day operation, 20,125 QSOs were made, 17,654 in CW and 2,471 SSB. Totals by bands: 160m—57, 80m—204, 40m—1,105, 20m—8,916, 15m—6,414, and 10m—3,429. Six continents and 123 countries were worked. *THE QSO* was on 160m with K7PQS/MM sailing the North Pacific off the Alaska coast! A 599 RST and even a short chat was possible!

A Palombo tribander was used for high bands; on 40m, 80m, and 160m an inverted V did well, 80m with the V at 15 meters high, and the others with the V 13 meters high.

The Teniente Jubany generator powered the station most of the time; our own generators were used only when power stopped from the base, from 0200Z to 0900Z.

During pileups, as many as 186 QSOs were realized in one hour, but after we got to 12,000 QSOs, pileups decreased and the rate came down to 120 QSOs per hour, tops.

Ending time came, and in a hurry all was disassembled because the ship was near the beach and all equipment had to be packed and taken aboard, in spite of strong winds and night coming. But anxiety to go home brought new strength to Alberto and Ronaldo, and in about ten

LU1DZ on the key at LU3ZI.

hours they were aboard, going back home after their 53-day adventure, a marvelous experience, and once again an expedition proved GACW's capabilities in such cases with first-class results.

Our special gratitude to Lieutenant Colonel Luis Fontana of the DNA, to all institutions who helped us, to friends and members of the GACW, and to all operators who helped us with their patience, understanding, and support, thus making the LU3ZI South Shetland Islands DXpedition a success to be remembered.

QSLs were to be delivered to GACW, Carlos Dihel 2025, 1854 Longchamps, Buenos Aires, Argentina—an address well known to DXers.

AUSTRALIA

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Australia

There are many contests on the amateur-radio bands throughout the year and Australia has its fair share, with most of us entering these contests, either seriously or in a lighthearted manner.

However, there is one contest in Australia that is never entered into with a flippant or lighthearted manner because of what it represents.

I am speaking, of course, of our Remembrance Day Contest, held on the closest weekend to August 15 each year to honor the Australian amateurs who lost their lives in WWII. This date, August 15, has special significance for us as it was on that day, in 1945, that all WWII hostilities ceased in the Pacific area.

The trophy itself is of typical amateur-radio-oriented design, featuring a yagi antenna mounted on a tower. This trophy is perpetual, being awarded each year to the winning division of the WIA (Wireless Institute of Australia).

As this is a local competition, with points being scored only for contacts between Australian call areas plus New Zealand (e.g., VK1 to VK0 and ZL) on all amateur bands, it does create a lot of friendly rivalry between each state's amateurs, with the winning state or division having the honor of keeping the trophy at their headquarters until they hand it over to the next winning division—but keeping it, of course, if they win it again. Their term as trophy holder is not forgotten as each winner has its name engraved on a metal shield attached to the base of the trophy.

The reigning champions of the RD Contest are the South Australians (VK5), with their latest win in 1983 making it ten wins out of the last twelve years. A remarkable achievement considering that they are competing against a much larger amateur population in the eastern states, e.g., VK2 or VK3.

We have, over recent years, had New Zealanders also entering into this competition with a lot of interest but, as yet, no luck in winning this trophy. Also in this category are the P29 (ex-VK9 Papua New Guinea) stations.

Certificates are also awarded to the top-scoring stations in each division, with the winning division being decided by the formula: Total points times weighting factor, divided by total divisional licenses.

Each division is divided as follows:

- VK1—Australian Capital Territories

Landing beach, 600 meters from the QTH.

QTH site at the Teniente Jubany station.

- VK2—New South Wales (plus Norfolk Island, Lord Howe Island)
- VK3—Victoria (and remainder of Australian Antarctica)
- VK4—Queensland (and offshore islands—Willis and Thursday)
- VK5—South Australia (and Northern Territory—VK8)
- VK6—West Australia (and offshore islands including Cocos, Keeling, Christmas, Heard, and part of Australian Antarctica)
- VK7—Tasmania (and Macquarie Island)

The VK0 is by far the most sought after, as a contact with them gives you the greatest single number of points.

In recent years it has been the policy of the WIA to have some notable person open this contest. So far, we have had three of our Prime Ministers honoring us with their presence, the latest one being the Rt. Hon. Malcolm Fraser, in 1976. We also have had two Ministers of Communication and several State Governors, with Mr. Richard E. Butler, Dy. Sec. Gen., ITU, doing honors for the occasion in 1979, showing that members of our government and other notable dignitaries hold this contest, and what it stands for, in the highest esteem.

Listening for this contest, you won't find the usual QRM all over the bands that we hear with some of the larger contests, for we have only approximately 14,000 licensed amateurs in Australia, with a percentage of these restricted to VHF and above. Also, not all of the remaining amateurs are interested in contests, so it makes it a real relaxed style of operating, with time to have a quick chat with old friends or overseas stations looking for a short QSO or new country—particularly in our early hours of the morning when any contact to keep you awake is very welcome.

K CALLS

The K call is a special license introduced in 1980 to cater to those amateurs who hold two licenses, namely the Novice and the Limited. There has been an abnormality with this class of license which our DOC (Department of Communications) has rectified this year.

Previously, the problem had been that as a Limited license-holder able to operate on all bands above 50 MHz, you did not have to pass any CW test, giving you a very technically-minded person who has passed the equivalent of our full-call license in the theory aspect but has failed, or has not tried, the test on CW at 10 wpm, send and receive.

The Novice license gives you access to the HF bands of 80, 15, and 10 meters, but to pass this test, you need CW at 5 wpm, send and receive, so it is possible for an amateur here to hold two licenses, one for his Novice call starting with, e.g., VK3 -N, -V, or -P, and his Limited starting with VK3 -X, -Y, or -Z. The result was much confusion on the bands.

This caused our DOC to create the K call, giving the holder of both licenses the option of using (but not requiring) one call-sign only, starting with a K, e.g., VK3K-.

The problem was that as a Novice he could operate on CW, but as a Limited he could not operate CW on the higher frequencies. The DOC has now granted the holders of this special call the privilege of CW operations above 50 MHz.

So, if you hear a VK3K operating on the higher frequencies using CW, please slow down, as his CW speed may be only 5 wpm. Some, with their keyboards, will be able to operate at higher speeds, but as our exam test is with a hand key, their expertise on the keyboard is to no avail until they pass the hand-sent test to gain their full-call license.

BRAZIL

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NEW PREFIXES IN BRAZIL

Since June, 1975, Brazilian states have had a special prefix so that an immediate identification was possible for radio amateurs in Brazil as soon as the call was given. Brazil has nine regions and 26 states and territories. The PY prefix was changed to PP, PT, PR, PS, PW, PV, or PU in certain regions, according to the number of states in each.

To identify Class C radio amateurs (allowed only phone mode on 80, 160, VHF and UHF, and CW mode on all bands except 20 meters), three-letter suffixes starting with W, X, and Y were in all prefixes now in use.

Also with the PY0 prefix for Brazilian ocean islands and DXCC "countries" (Fernando de Noronha, Trindade, and S. Peter/S. Paul), this sure was a hit with prefix-hunters all over the world, delighted with new possibilities.

But what couldn't be imagined by Brazilian authorities was the tremendous run to Class C, since VHF facilities and conveniences and a "no-code" license were a very strong appeal to former CBers and others.

VHF being their only goal, almost no one cared for HF restrictions, and so VHF operators came by the thousands, thus "blowing up" the system by using up all "three-letter" combinations started by W, X, and Y! So a new law has been published in Brazil, modifying Class C prefixes and creating a new curiosity for prefix-hunters.

From February 13, 1984, Class A and B radio amateurs (except for Amapa Territory—PU8...) will continue with their actual call letters, prefixes, regions, and suffixes as before; Class A and B radio amateurs in Amapa territory will be PY8, like in Para State.

Important modifications come to Class C operators now all under PU prefixes from 1 to 9, according to the region they belong to. No more PP, PT, or PY, but only as follows:

- 1 Region—PU1—Rio de Janeiro and Espirito Santo States
- 2 Region—PU2—Sao Paulo, Goias, and Federal District
- 3 Region—PU3—Rio Grande do Sul State
- 4 Region—PU4—Minas Gerais State
- 5 Region—PU5—Parana and Santa Catarina States
- 6 Region—PU6—Bahia and Sergipe States
- 7 Region—PU7—Pernambuco, Ala-

goas, Paraiba, Rio Grande do Norte, and Ceara States

- 8 Region—PU8—Para, Amazonas, Maranhao, Piaui, Acre, Rondonia, and Amapa States, and Roraima Territory
- 9 Region—PU9—Mato Grosso and Mato Grosso do Sul States; PU0—Ocean Islands Fernando de Noronha, Trindade, S. Peter/S. Paul Islands

So what's going to happen from now on? Well, NEW Class C radio amateurs will have their calls according to PU prefix determinations; already prefixed radio amateurs a few at a time will be called to DENTEL (the Brazilian Telecommunications National Department) and will have their prefixes changed according to the new law. This will take some time, for Class C operations in Brazil are a great majority spread all over our big country; this will mean trouble for our authorities.

Due to this new law, the PU8BI operation from Macapa, in Amapa, took place under a ZY8BI call (QSL information to PY8BI as announced), a last-minute change although the *DX News* sheet and others had spread the word.

CW operators will have a better chance to QSO the new PU Class C since regulations allow them almost all CW bands except 20 meters!

de PY1CC

AMATEURS VISIT PRESIDENT FIGUEIREDO

Directors of the Brazilian Amateur Radio League (LABRE) were kindly received in the Palace by the President of Brazil, General Joao Baptista Figueiredo. Taking the opportunity, they invited him to head the first meeting of the 4th Brazilian Convention held in the city of Brasilia to celebrate the 50th anniversary of the League. The audience lasted about thirty-five minutes, and the President asked questions about amateur-radio activities in Brazil. Finishing the audience, the President surprised everybody when he said that he also expects to be an operator after his time as President. In fifty years of the League, it was the first time that a group of operators was received by a Brazilian President.

THE DEATH OF W4KCF

With deep regret, the *Bulletin* edited by the Brazilian League recorded the passing of Victor C. Clark W4KFC, President of the American Radio Relay League. The death of Vic brought a painful sense of loss to all amateurs in the world.

MEDITATION

Inge Tobias de Aguiar PY2JY is well known as the controller of the Brazilian Young Ladies Net, meeting every Wednesday on 14.248 MHz from 1900 to 2100 UTC. One night, about two years ago, while in a hospital after a surgical operation, the consequences of which were not then known, she wrote on a piece of paper this meditation, which I will translate, trying to give the same meaning as it had in Portuguese.

My God, if I die now, I will die happy
Because I knew friendship,
Kindness, collaboration, and altruism.
Since my first day as an amateur,
Up to now, nobody disappointed me.
From South to North, from West to East,
I have friends and when they hear me,
They become happy to meet me again.
A lot of them, I will never know personally.
Only through their QSLs or letters.
Hearing their voices
I'm happy when I can recognize
A few of them whom I had known personally
In someplace in the world.
They received me like a sister,
And we enjoyed ourselves with happiness,
Like very old good friends.
When I participated in any emergency operation,
I never stayed alone.
Always I had friends who helped me.
I could understand that amateur-radio activity
Is always friends working together.
When I needed help,
I received it immediately.
Nice friends!
To be an amateur is to live with happiness.
Happiness to have so many friends
On whom you can count always.
Happiness to have the chance to help someone with difficulties.
Sadness when you need to transmit bad news.
Happiness to be acquainted to another friend.
Happiness to meet someone again.
Happiness to have the chance to help impartially.
And I am happy because I am sure I performed my duty.

de PY1APS

GREAT BRITAIN

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THE UK SCENE

I wonder at the continuing ingenuity of equipment designers to produce more and more exciting products that do not really offer any significant improvements in performance in relation to their fundamental job (or principal function)!

The prime example of this must be in the ongoing development of radio receivers for the enthusiastic listener (rather than the hi-fi enthusiast or casual observer). There do not seem to have been any significant strides in performance recently. (Performance, that is, measured by way of sensitivity, signal-to-noise ratio, intermodulation distortion, or whatever.) And yet the new models continue to hit the streets and continue to persuade large numbers of listeners to part with large quantities of hard-earned cash. The most recent model is the Sony ICF 7600D synthesized full-coverage shortwave receiver (with Band 2 FM coverage just in case you get fed up with the QRN and QSB).

I have had a Sony ICF 2001 for about 18 months since I acquired it for a trip to Nigeria. Whilst in that country I wanted, obviously, to be able to tune in to BBC World Service (if only to remind myself that home was still there). I also needed to make some subjective assessments of shortwave propagation from up country to Lagos. The ICF 2001 was a useful piece of kit, particularly in an area with a crowded shortwave spectrum. Being able to find readily a particular transmission simply by keying its frequency was a positive bonus.

That was the good news—the bad was the size and weight of the unit (although much smaller than a "conventional" shortwave receiver) and its voracious appetite for D cells which I had to take in quantity to avoid being dead in the bush.

The new model, though, comes very close to the shirt- or vest-pocket shortwave radio (of reasonable performance, that is). Although only small enough to fit into a poacher's pocket, it will fit easily into a corner of my briefcase. This means I can carry it (and its AA-size dry cells) on my many business trips. And that was the justification for paying about $250. Now when I am away on business, I can still listen to the world.

It never ceases to amaze me just how much traffic there still is on the shortwave bands. Satellites and computers and other hi-tech gadgetry are OK in their place, but, seemingly, there is still no substitute for tried and tested methods.

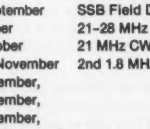
A recent bringing together of computers and shortwave radio may be of interest to aeronautically-minded readers. A number of utility stations around the world transmit Volmet messages giving plain-language weather information for principal airports. The broadcasts, including information such as cloud base, visibility, current weather, etc., are intended primarily for aircrew. The Royal Air Force (RAF) is responsible for some Volmet transmissions in the UK. On 4.720 MHz they now use a computer-synthesized voice. The station seems to broadcast all day.

UK CONTESTS

The Radio Society of Great Britain (RSGB) organizes and coordinates a great many contests throughout each year. Many of these are on the VHF bands and above (70 MHz, 144 MHz, 432 MHz, 1296 MHz, and higher frequencies being represented) and of little interest, therefore, to non-European readers. There are, however, a number of HF contests with an emphasis on working UK stations. Those following the publication date of this issue of *73* include:

• 2–3 June	HF National Field Day
• 23–24 June	Summer 1.8 MHz
• 15 July	QRP Field Day
• 1–2 September	SSB Field Day
• 7 October	21–28 MHz phone
• 21 October	21 MHz CW
• 10–11 November	2nd 1.8 MHz
• 12 November, 20 November, 28 November, 6 December, and 14 December	28 MHz Cumulative

In all cases, UK stations will be looking for as many DX multipliers as they can find. DX stations will find these dates useful for increasing their log entries of all UK prefixes.



ISRAEL

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In the last few columns, I've dealt with specific areas of amateur radio in Israel. In the meantime, a number of news items have accumulated, so the time has come to take care of these odds and ends.

CONTESTS

The Israel Amateur Radio Club Contest Committee has announced three upcoming competitions. The first two are on a national basis—the Spring Contest on Israel Independence Day, May 7, on 160, 80, and 40 meters only, and a VHF-UHF test to be held in the summer. Of interest to readers of this column is the long-awaited Israel-International DX Contest that is planned for mid-October. When details become available, they will be rushed to the international amateur press.

THE JERUSALEM AWARD

The following are the final requirements for the coveted Jerusalem Award: Ten different Israeli stations must be worked, including no less than seven Jerusalem stations. All modes and bands are permissible, and the contacts must have been made since January 1, 1983. No QSLs are necessary—just a log of the contacts, verified by two other licensed amateurs. This is to be sent along with eight IRCs to the award manager, Dr. Milt Gordon 4X6AA, PO Box 4079, Jerusalem, Israel.

The rules for the two awards of the Israel Amateur Radio Club remain unchanged and are to be found in this column in the August, 1983, issue of *73*.

STS-9

Quite a bit of interest was created here by the flight of the STS-9 space shuttle with Dr. Owen Garriott W5LFL operating on board. A few diehards assembled the antennas specified by AMSAT and kept themselves up-to-date on orbit and frequency information. To the best of my knowledge, the only contact with the *Columbia* in our region was made by our neighbor, His Majesty King Hussein JY1. In the Royal Palace, an American television crew recorded this historic QSO, which later was televised all around the world. At the time of this contact, amateurs in the region who were monitoring W5LFL's frequency heard nothing, pointing to the fact that this contact was a prearranged sked.

NEW REPEATER FOR TEL AVIV

Tel Aviv has become the recipient of a brand-new, two-meter repeater to replace the old one, long suffering from problems of intermod and low sensitivity. In a ceremony in the Motorola Israel offices, Yair 4X4GH, Avner 4X4GE, and David 4X4WA, representing Motorola, presented the repeater to representatives of the IARC. Since then, Aharon 4Z4AG has been testing and adjusting the machine, and by the time this is in print, it should be on the air on R7, 145.775/.175 MHz.

Yair Yosefi 4X4GH, speaking for Motorola, said that his firm views the amateur public as a technical resource in the field of electronics, and thus Motorola continues to aid the radio amateurs of Israel in developing a national repeater network. In reply, IARC president Aharon Kirschner 4X4AT gave recognition to the fact that the entire chain of IARC repeaters has been donated by Motorola Israel. Aharon praised Mr. Yosefi, who had done everything in his ability to aid the IARC. After the speeches were over, glasses were raised to toast "the repeaters that are on the way." The meeting was concluded with a guided tour of the company's labs, conducted by 4X4GE.

MINISTRY OF COMMUNICATIONS NEWS

An ongoing dialogue, once every three months, is being held with representatives of the Ministry of Communications. The following items have been concluded up to this date.

Every planned change in amateur licensing will be made known to the IARC executive before it is made public knowledge. The chart of allotted frequencies and powers will be deliberated upon by a joint group from the Ministry and the IARC. The possibility of placing IARC re-

pesters in Ministry of Communications sites will be examined.

The process of licensing visiting amateurs from abroad is to be simplified. And the physical size of the amateur license is to be reduced from certificate to wallet size.

CB IN ISRAEL?

A committee from the Ministry is to be set up to examine the establishment of a code-free license according to the following guidelines: The license will be granted to those passing an exam covering conditions of the license, voice operating procedures, and safety precautions. A single crystal-controlled frequency in the 27-MHz region will be allotted, and both input and effective radiated power will be limited.

Ehud "Ed" Zager 4Z4UR has compiled a 12-page booklet dealing with lightning and communications systems. The book, distributed free of charge to IARC members, covers everything you ever wanted to know about lightning, the damages it can cause, and how to protect your station effectively from its ravages. Who knows? Maybe Ed can be convinced to put out an English edition!

Not long ago, I received an unexpected but welcome visitor, Major George Mixom N41OM, who recently came over to these parts to serve with the Multinational Forces in the Sinai peninsula observing the Israel-Egypt peace treaty. George, a reader of this column, was on his way back to Egypt after picking up his Israeli reciprocal license in Tel Aviv and decided to drop in and say hello. There is not yet an Egyptian-American reciprocal licensing agreement, so George doesn't know if he'll be able to get permission to operate portable SU. If he does, I'm sure he'll have some big pileups to contend with.

In conclusion, I'd like to give you again the present procedure for obtaining a reciprocal license during your visit to Israel. You appear in person with your valid amateur license (not a photocopy) at the office of the Ministry of Communications, on the tenth floor of the Shalom Tower on Ahad Ha'am Street, downtown Tel Aviv's highest building. A reciprocal permit will be issued on the spot free of charge. Office hours are from 9:00 am to 1:00 pm, Sunday through Thursday, and the phone number is (03)-610278.

ITALY

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Italy

The January issue of *Radio Rivista* (the Italian League magazine) dedicates one page to the awards sponsored by *73* with the reproduction of three of the awards. On the opposite page there is a photo of the Italian Islands Award. It's a very nice one and we have been writing about it to call your attention to it. (See the January column.)

In the same magazine, the cover photo and 10 pages cover usage of the personal computer in the radio shack. Particular attention is given to the Commodore 64 that is becoming very popular in Italy (we are waiting for the first copies of *RUN*) and to some locally-built interfaces.

Lots of excitement between Italian 2-meter users for the activity of W5LFL during the first days of December. Owen Garriott was heard with very strong signals on the 5th and the 7th of December and was worked by a few of the 2-meter big guns. It was not necessary, in any case, to have anything special to read him; it was enough to turn on a hand-held transceiver, but it was not easy to work him due to the huge number of people calling him.

I1NRF and I5FBP have had confirmation of contacts; more are expected.

NEW FREQUENCIES IN ITALY

The Italian Ministry of Telecommunications has given written confirmation of the new frequencies assigned to Italian operators.

- 1830–1850 kHz with a maximum output power of 100 W. For the area of Sicily, the upper limit is 1845.
- 18068–18168 kHz. For the moment, only on a secondary priority basis; awaiting the reallocation of the existing services to other frequencies to become primary.
- 24890–24990 kHz. Same situation as above.
- 1296-1298 MHz with a maximum ERP of 50 W.
- 1267–1270 MHz only for satellite service, to be assigned on a personal basis upon request.
- 10100–10150 kHz. We will be authorized to use only 10 kHz on this band. The Italian League has been requested to investigate and report what is the best part of these frequencies. The choice will be very easy as we will only have to find where the interference is lowest. In fact, Radio Moscow is received at 10115 with 9+40 signals and Arabian broadcasting uses 10120 with 9+20 reports.

MOBILE SERVICE, REPEATERS

The Ministry of Telecommunications has agreed to authorize the local operators to work mobile on 144 MHz and up with a maximum power of 10 W; no clarification is given as to whether this is input or output.

This is an important point as it recognizes the mobile service, and possibly it can be a first step to get the same kind of authorization also on HF.

The same day, the authorities recognized the existence of repeaters on the 2-meter band. Rules will be issued on this matter in a short time.

80 METERS

The 80-meter band is still a subject of dispute between the League and the Postal Administration. We can now see the possibility of finding a solution to be able to use all the band, but it will take several months to reach the final agreement.

A first step towards it is the acceptance from the Administration not to take too strong actions against hams found out of the authorized small portions of frequencies. From now on, the "bandits" will receive only a written note of the violation instead of having the license suspended for one month and a fine. All the above is a clear indication of a different attitude towards the amateur community, and this is mainly due to the kind but firm approach taken by the Italian League. Let's hope it will continue this way.

FIRST CA RTTY

The first county RTTY award has been given to Joe I0AOF from Rome. He had to contact 12,000 US stations to be able to reach the 500 different counties. In the meantime, he has also worked 192 countries and is now trying to reach the 200 level; that is quite an achievement for a RTTYer! He is always looking for the States, so if you hear him, give a call.

★★★★★

Maybe you will be interested to know that in our country you can install a television station and broadcast porno films all through the day and you will get into no troubles.

LIBERIA

Brother Donard Steffes, C.S.C.
EL2AL/WB8HFY
Brothers of the Holy Cross
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Republic of Liberia

Antenna parties! Amateurs here in Liberia love to go to antenna parties!

Saturday night I was talking to one of my friends on two meters. He had spent most of the day on Embassy Hill helping to put up a three-band Cushcraft. He apologized because I was not invited for the occasion. As a matter of fact, it was less than a year ago that I had helped put up the same antenna at another location. Evidently, in this instance, they had a tower on the roof of a multi-storied building and had found it necessary to build a working platform at the base of the tower. The size of the platform limited the number of "experts" that could be accommodated. I felt left out but understood that it really could not be helped. As it worked out, the antenna didn't work.

It was too late in the day to do anything more, so everyone went home and we spent the evening on two meters advising the group on what they should do the next day. I made the brilliant suggestion that they make some ohmmeter checks before they take down the whole antenna.

"There is really no reason why the thing shouldn't work."

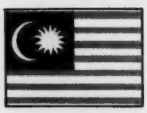
After a hard night, the group reassembled the next day, which was Sunday, and began to run tests. It turned out that the balun was shorted so they took it out and connected the coax directly to the driven element. After a few loops were put into the feedline at the upper end, the swr was almost one to one.

I mentioned above that we had put up the same antenna for another amateur less than a year previously. He was a beginner and had built his first kit, a Hot Water one zero one. That didn't work either. Just about the time we finished troubleshooting the rig and had him on the air, he was given another assignment and sent to another country. That is a chronic situation in these parts, at least so it seems.

In my experience, amateurs like to help each other, but over here in Liberia I think that this spirit is "special." The reason is, of course, that there are so few of us and the fact that parts and service are scarce. In spite of poor mail service, we manage to move radios and parts up and down the country as the necessity arises. It may take a couple of weeks or a month, but patience is something that one learns very rapidly.

We do have a good repeater and that gives us communication with amateurs who have two-meter equipment, but more importantly we have the West African Net which meets every Sunday morning at 0800 Zulu. Most of the counties of Liberia check in on Sunday morning so we are able to pass messages. The net meets daily at 0700, but not as many of the stations are able to check in on the daily schedule.

We don't miss an antenna party if we can help it.



MALAYSIA

Mohammed Salleh 9M6MO
Radio & TV Malaysia
Mile 1½ Tuaran Road
Kota Kinabalu
Sabah
East Malaysia

MOUNT KINABALU EXPEDITION

We started off from Kota Kinabalu at about 1500 local time (0700 UTC) on January 13, arriving at Kinabalu National Park at 1700. The National Park is about 48 miles (77 km) from Kota Kinabalu. There were ten of us in the group—I was the only amateur-radio operator. Eight of us managed to get beds in the hostel. (One of my friends and I had to sleep in our individual cars.) The park is 5000' (1524 meters) above sea level. The night was quite cold and it was raining.

The next day at 0700 we reported at the park headquarters located a few hundred yards from the hostel. After having coffee at the park's canteen, we started off in a hired vehicle (small truck) to the power station three miles away. From the power station, we started walking up. We had one guide and we did not hire any porter to carry our load. Every one of us carried a haversack. I had to carry a 2-meter mobile transceiver, one 12-volt, 12-Amp/hour motorcycle battery, and an antenna (Slim Jim). The antenna is a home-brew job from *Practical Wireless*, for April, 1978, F. C. Judd G2BCX.

When we started, Sylvester, one of my friends in the group, decided to help me carry the battery and the 2-meter rig. This was really appreciated because we were to climb about four miles before stopping over for the night at the Panar Laban shelter at 11,000 feet (3,000 meters). All along the way the temperature was comfortable and cool. We took some pictures; we were very tired as we got closer to Panar Laban. I felt a little short of breath and had a slight headache at the high altitude.

Some of the boys reached Panar Laban at 1230, but myself and three others arrived at 1500. It was a relief to see Panar Laban!

After getting the bed and the sleeping bag ready, I set up the equipment (FDK 800D, 2-meter FM) with the antenna between two rocks, almost on the ground. I started calling CQ at about 0500 UTC with one Watt of power, FM. Not long after the call, I heard VS5HG from Bandar Seri Begawan, Brunei; he came in 5/7. He was running 25 Watts into a groundplane. Brunei is about 320 km away. And after about 20 minutes of the QSO, during a break, I heard another station talking to VS5HG.

The other station was a bit weak with a lot of noise. Later on, I could identify that it was Gerald VS5GA. So I asked VS5HG to tell Gerald that I could hear him weakly. Later on, I understood that Gerald could hear me, so I increased power to 5 Watts. So, with me running 5 Watts and Gerald running 25 Watts, we managed a long

Continued on page 122

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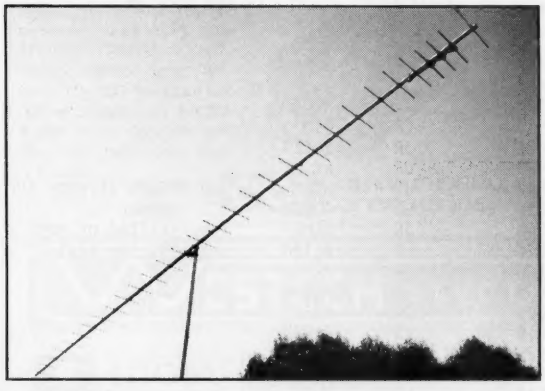
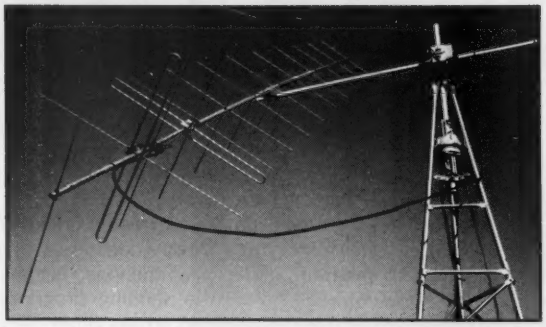
Fiberglass/aluminum stacking frames are available as well as 2 and 4 port power dividers and phasing harnesses to optimize the performance of these type arrays.

Watch for our new elevation drive system coming soon.



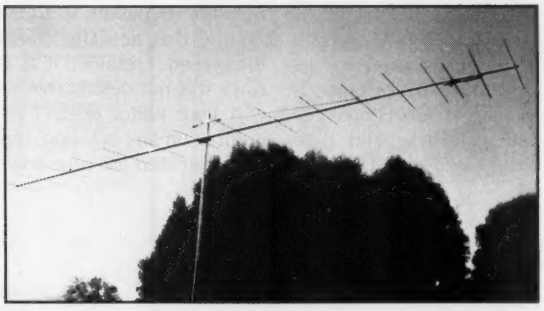
432-30LBX

BANDWIDTH	430–440 MHz
*GAIN	17.3 dBd
BEAMWIDTH	(E) 19°, (H) 20°
FEED IMP	50 ohms unbal.
BALUN	included
BOOM LENGTH	21 ft. 11 in.
F/B	20 dB F/S 30 dB
VSWR	1.5:1
WINDLOAD	1.71 sq. ft. (max.)
TURNING RADIUS	12 ft. 4 in.
WT. (lbs.)	9 lbs.



2M-22C

BANDWIDTH	144–148 MHz
*GAIN	13 dBdc
BEAMWIDTH	(E) 32°, (H) 32°
FEED IMP	50 ohms unbal.
BALUN	(2) 4:1 coaxial
BOOM LENGTH	19 ft. 1 in. (tapered)
VSWR	1.5:1
WINDLOAD	1.85 sq. ft. max.
ELLIPTICITY	± 1.5 dB max.
CIRCULARITY SWITCHER	CS-3 included
WT. (lbs.)	11 lbs.



2M-16LBX

BANDWIDTH	144–146 MHz
*GAIN	(144 MHz) 14.5 dBd
BEAMWIDTH	(E) 26°, (H) 29°
FEED IMP	50 ohms unbal.
BALUN	4:1 coaxial, 2 KWPEP
BOOM LENGTH	28 ft. 1 in. (tapered)
VSWR	1.5:1
WINDLOAD	(H) 1.75 sq. ft. (V) 2.44 sq. ft. max.
WT. (lbs.)	10 lbs.
TURNING RADIUS	15 ft. 5 in.

See the complete line of KLM antennas and equipment at your local dealer, or write for our catalog.

*To provide a more accurate and consistant gain figure, performance of this KLM antenna has been carefully measured and correlated in accordance with National Bureau of Standards Note #688. This gain figure may appear somewhat conservative when compared with others commonly found in conventional industry literature and based on older, less exacting rating methods.

KLM electronics, Inc.
P.O. Box 816
Morgan Hill, CA 95037

James B. Johnston K6APW
1026 Peralta Avenue
Albany CA 94706

Try Quality Code

Using this Mod III update is much simpler than saying its title trenty times.

You TRS-80 Model III users who didn't "patch" the fine keyboard program written by Louis Graue K8TT (*73*, July, 1982) have possibly missed a nice station addition. I did not like the messy screen that the original patch-up left me, so this insert was written. Lou has graciously tested this and a previous version and reports this one runs fine on his Model I also.

The two models have partially different ROMs and the calls used to decode the miscellaneous keys read in 3840H memory location give invalid data for the Model III. This substitution instead continues the software decode.

To keep the video in sync with the sending program, unshifted arrows other than backspace are ignored. Attempts to use expanded video by loading 07H in line 3570 (right arrow) gave different, though equally fatal, problems for both models. The 10H in the listing, when shifted, will give an "extra" space bar. Sending "clear" directly to video memory bypasses a ROM routine that actually clears the screen. I retained it as is since it is not destructive.

If your editor doesn't renumber on line collision, use a smaller step for your insertion and renumber from the top when finished. The procedure—delete lines 3260 through 3550 and insert the listing shown here.

If you have included the comment lines, the renumbering will give an easy-to-read two-hundred offset to SCHR and following lines. Lou and I both experienced symbol table overflow when assembling—not enough memory. After saving the source file, eliminate as many comments or comment lines as necessary to free memory.

New Information

Lou passed along from John Meade W2XS support of BT, AA, AR, and SK. Change the data in the following lines:

Line	Character	Key
2450	BT = 0D1H	-
2580	AA = 0E5H	:
2590	AR = 0CAH	;
2610	SK = 85H	=

I key my solid-state transceiver directly with one 2N2222 driven through a 2.2k-Ohm base resistor by substituting a two (02H) for the zero in lines 220, 1290, 1590, 1770, and 1960 of the original listing. This change gives a true zero out instead of 0.4 volts.

Good luck and I hope to hear some Model III keyboards soon. ■

Program listing.

Delete lines 3260 through 3550:

Insert:

```
3260  ;KEYSCN insert for K8TT CW KEYBOARD of
3270  ;73 MAGAZINE  July 1982
3280  ;TRS-80 MOD I and III - K6APW  March 1983
3290  ;
3300          JR      C,SCHR      ;@ through Z (no shift)
3310          SUB     70H         ;numbers?
3320          JR      NC,COMPUT   ;go if not numbers
3330          ADD     A,40H
3340          CP      3CH         ;0 through 9 :;,
3350          JR      C,SHBIT
3360          XOR     10H         ;make -./
3370  SHBIT   RRC     B           ;left (both MOD I)
3380          JR      C,SHIFT
3390          RRC     B           ;right
3400          JR      NC,SCHR
3410  SHIFT   XOR     10H         ;make uppers
3420          JR      SCHR
3430  COMPUT  CP      07H
3440          JR      Z,SPACE
3450          CP      05H
3460          JR      Z,LF
3470          JR      NC,RT
3480          CP      03H
3490          JR      Z,UP
3500          JR      NC,DN
3510          CP      01H
3520          JR      Z,CLR
3530          JR      NC,BK
3540          JR      SCHR        ;no ENTER, already NUL
3550  LF      LD      A,08H
3560          JR      SCHR        ;go, shifted or not
3570  RT      LD      A,10H       ;not 09, see text
3580          JR      ARROW
3590  UP      LD      A,0BH       ;not 5BH
3600          JR      ARROW
3610  DN      LD      A,0AH
3620  ARROW   RRC     B
3630          JR      C,SH
3640          RRC     B
3650          JR      C,SH
3660          LD      A,0         ;keep video sync
3670          JR      SCHR
3680  SH      ADD     A,10H       ;shift them
3690          JR      SCHR
3700  CLR     LD      A,1FH
3710          JR      SCHR
3720  BK      LD      A,01H
3730          JR      SCHR
3740  SPACE   LD      A,20H
3750  ;
```

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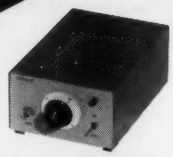

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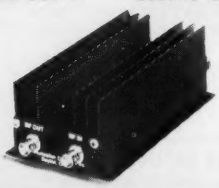

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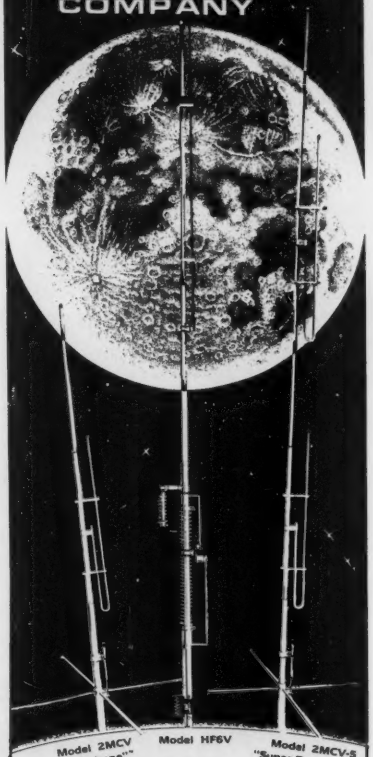

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HAM HELP

We are happy to provide Ham Help listings free, on a space-available basis. We are not happy when we have to take time from other duties to decipher cryptic notes scrawled illegibly on dog-eared postcards and odd-sized scraps of paper. Please type or print your request (neatly!), double spaced, on an 8½" × 11" sheet of paper and use upper- and lowercase letters where appropriate. Also, please make a "1" look like a "1," not an "l," which could be an "el" or an "eye," and so on. Hard as it may be to believe, we are not familiar with every piece of equipment manufactured on Earth for the last 50 years! Thanks for your cooperation.

Need schematic diagram for the Spectronics DD-1 digital frequency display which I'm using with a Yaesu FT-101E. Will make copy and return. Please send to:

Jack Duncan K0CNM
RFD 3, Crestview Drive
Denison IA 51442

Help! I now own a working NC-109 general-coverage receiver. I need information about it so that when it no longer works, I can find out why. (Also, I may want to perform modifications to it.)

Also, I have been having a terrible time tryig to connect a Western Electric #1035C3A-type touchtone™ pad to a 500-type telephone set. Any help at all will be greatly appreciated.

Andrew W. Gaunt
52½ Washington Street
Newburyport MA 01950

Does anyone have a way to convert a TI 99/4a computer into a code keyboard?

B. F. Knoll XA8TIO
707 N. Wisner
Jackson MI 49202

I need an operating/service manual for a Javelin model 3100 (North American Video Corp.) closed-circuit TV camera.

Larry Steele K0UKO
5060 Chickweed Dr.
Colorado Springs CO 80917

I need any information, manuals, or schematics for the Analab Type 1100 oscilloscope with Type M 16 plug-in.

W. A. (Walt) Eddy K5GDD
111 N. Maddox
Dumas TX 79029

I am desperately looking for a few of the miniature CB walkie-talkies made by Data Magnetics Corporation called the Pocket Com. They were two-channel 100-mW units, model number XB-100.

I am also interested in old CB equipment of all types and conditions. Please send info and prices.

Dennis R. Starks
Box 95
Cross Timbers MO 65634

Please, where can I find a manual for a solid-state OS-8G scope?

Russ Lawson K1MOU
124 S. Grand Street
W. Suffield CT 06093
(203)-668-2871

I am looking for schematics and/or operator's manuals for the Regency Monitoradio 4-band receiver (model WT4) and the Johnson Viking Adventurer transmitter (no model no.). I also need crystals for the xmitter for any of the Novice bands. I will pay reasonable costs.

Carl Arndt
Box 215
Andale KS 67001

I need the schematic (only) for a Gonset model G-77 mobile transmitter. Also, I need a schematic (and possibly manual) for a Calico (California Instruments Co.) model 8000 digital voltmeter. I will pay reasonable copying costs and postage. Thank you.

W. Richmond WD4CPQ
521 Rawlings St.
Louisville KY 40217

A circuit diagram is needed for a vintage receiver (about 1940) built by the Mackay Co. for maritime communications, with regenerative control, Model 128AX. It covers .15 kHz to 640 kHz in four bands. Any help will be appreciated.

Ken Hunt WB7OVU
6519 Valhalla
Klamath Falls OR 97601

Need schematic diagram and manuals for (1) Lafayette Model HA-600A solid-state 5-band receiver, and (2) Kantronics Model 80-40B direct-conversion CW receiver. Will pay copying costs and postage.

M. K. Eliefson W1KJF
128 Morningside Drive East
Bristol CT 06010

I need a schematic/service manual for a Kris Mach 3-B, amateur bands, 10 and 6 meter, linear amp, serial #112608. I will gladly pay for information!

William G. Sallenger
Rt. 2, Box 524
Windsor NC 27983

I'd like to hear from anyone who has successfully interfaced a Model 33 Teletype machine to a Vic-20. I want to use the Model 33 as a printer for a Vic/AIR-1 system.

Bob Howle WA4ZID
Rt. 1, Box 516
Union MS 39365

I will be on a student bicycle tour in the Cape Cod, Massachusetts, area in the month of August. I plan to operate two meters FM on the trip from the following areas: Truro, Orleans, Nantucket, Martha's Vineyard, and Plymouth and would like to hear from hams in these areas to find out what the best range repeaters are. Any info will be appreciated and acknowledged.

Jeff Gornstein KD2BE
35 Green Hill Road
Springfield NJ 07081

I have been interested in hamming for some time, but until now have never taken the appropriate time to really look into what is necessary to get started. I am a missionary with the Salvation Army, serving in Buenos Aires, Argentina. I have spoken with my father in St. Louis a number of times with the aid of a licensed operator here.

I would like to know how to get started and what equipment is necessary. I will not be able to use a rig here in Argentina, as I only have 1½ years yet here, then will be coming back to the States. And here, to be able to use a ham outfit, you have to have a complete, thorough police clearance (because of the trouble in the past with undercover groups using the radio against the government). But perhaps I can study and get in contact with a licensed operator here who is from the States.

Can you put me in touch with someone who can help me? Any help that you can give or suggest will be greatly appreciated.

Thank you again for your help.

Capitan Richard B. Forney
Ejercito de Salvacion
Sucursal 3, Casilla 194
1403 Buenos Aires
Argentina

Need the schematic and crystal multiplication factor for the KAAR FM TR500 transceiver (450 MHz).

Need schematic and info on adding FM capability to the R-482/URR-35 receiver (225-400 MHz).

Harold D. Donaldson WB6SKV
8850 Phoenix Avenue
Fair Oaks CA 95628

Recently I met a young lady who is traveling to Southern Yemen this summer to be a missionary for two years. I offered to try to set up a schedule with a ham operator in Yemen. Well, I'm sure you already know my problem—the most recent information I have does not list South Yemen as allowing third-party traffic or reciprocal operating licenses. Do you know if the US Embassy there operates a ham or MARS station (I'm in the military), and if so, what would be the best way to set up a schedule so that she could send traffic back home? Do you have any other ideas on how we could work around the third-party traffic regulations? She will be working at a hospital in an American compound only a few hours from the US Embassy.

You can be of tremendous help since I have never before attempted to set up a schedule with a DX station and am running into a lot of problems that I don't know how to work around.

David Patton WA4TQB/8
3410 El Morro Road
Colorado Springs CO 80910

Wanted: Atwater Kent speaker.

Q. R. Galbraith K5TVC
4303 Kingsway Drive
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CORRECTIONS

The address for Ham MasterTapes, as it appeared in the May "Review" section, was incorrect. The new address is 136 East 31st Street, New York NY 10016.

Jim Gray W1XU
73 Staff

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SOCIAL EVENTS

Listings in this column are provided free of charge on a space-available basis. The following information should be included in every announcement: sponsor, event, date, time, place, city, state, admission charge (if any), features, talk-in frequencies, and the name of whom to contact for further information. Announcements must be received by 73 Magazine by the first of the month, two months prior to the month in which the event takes place. Mail to Editorial Offices, 73 Magazine, Pine St., Peterborough NH 03458.

BLACKSBURG VA
MAY 31–JUN 2

Virginia Polytechnic Institute and State University will hold a new workshop, Personal Computer and STD Computer Interfacing for Scientific Instrument Automation, on May 31–June 2, 1984, at Virginia Tech, Blacksburg VA. The workshop is $395.00 for the three days and will be directed by Mr. David E. Larsen, Dr. Paul E. Field, Dr. Jonathan A. Titus, and Dr. Christopher Titus. Each participant will wire and test interfaces. For more information, write Dr. Linda Leffel, CEC, Virginia Tech, Blacksburg VA 24061, or phone (703)-961-4848.

SEASIDE OR
JUN 1–3

The 1984 Oregon State/ARRL Northwestern Division Convention will be held on June 1–3, 1984, at the Seaside Convention Center, Seaside OR. A single convention registration is $5.00 in advance and $7.00 at the door; a couple convention registration is $7.00 in advance and $9.00 at the door; a teen convention registration is $2.00 (children under 12 will be admitted free). Flea-market tables are $5.00 each per day or $8.00 each for two days. Hours on Friday are 5:00 pm to 9:00 pm; on Saturday, 8:00 am to 9:30 pm; and on Sunday, 9:00 am to 2:00 pm. Snack bar food will be available. In addition to the flea market, features will include exhibits, seminars, forums, ladies' and children's activities, an ARRL breakfast, and a Saturday-evening banquet with guest speaker Roy Neal K6DUE, Science Editor of NBC News. Talk-in on 145.45 (–600) and 146.52 simplex. For advance tickets for the banquet ($13.50 each) and registration, send a check payable to Oregon State Ham Convention to Oregon State/ARRL Northwestern Division Convention, PO Box 920, Seaside OR 97138. For additional information, call 1-(503)-640-5456, 1-(503)-738-6461, or 1-(503)-644-0752 evenings.

GUELPH ONT CAN
JUN 2

The Guelph Amateur Radio Club (VE3ZM) will hold the 10th annual Central Ontario Amateur Radio Flea Market and Computerfest on Saturday, June 2, 1984, from 8:00 am to 4:00 pm, at Regal Hall, 340 Woodlawn Road West, Guelph ONT. General admission is $2.00 and children 12 years and under will be admitted free. Vendors' admission is $5.00 per 8-foot space. Doors will be open to vendors only from 6:00 am and a quantity of 3' × 8' tables will be available for rental for $5.00 each. Features will include commercial displays, surplus dealers, computer software and hardware, indoor and outdoor displays, and a refreshment concession. Talk-in on 147.960/147.360 (VE3ZMG) and .52/.52 simplex. For further information, contact Susan Barabus VE3BEC or Joe Barabas VE3BXN at (519)-824-1404 (Guelph), Ralph Bartlett VE3BJX at (519)-836-2097 (Guelph), Henry Christiansen VE3BYU at (519)-743-9022 (Kitchener), Fred Hammond VE3HC at (519)-822-8323 (Guelph), or the Guelph Amateur Radio Club, PO Box 1305, Guelph ONT N1H 6N9, Canada.

ST. PAUL MN
JUN 2

The North Area Repeater Association will sponsor a swapfest and exposition for amateur-radio operators on Saturday, June 2, 1984, in the Dairy Products Building at the Minnesota State Fairgrounds, St. Paul. Admission is $4.00 and children under 12 accompanied by an adult will be admitted free. The hours are 6:00 am to 5:00 pm; activities will begin outside at 6:00 am and inside at 8:00 am. There will be free overnight parking for self-contained campers on June 1st. Features will include exhibits, booths, club activities, demonstrations, and a giant outdoor flea market. Talk-in on .25/.85 and .16/.76. For more information, write Amateur Fair, PO Box 857, Hopkins MN 55343, or call (612)-420-6000.

STEVENS POINT WI
JUN 3

The Central Wisconsin Radio Amateurs, Ltd., will hold its annual swapfest and family picnic on Sunday, June 3, 1984, from 9:00 am to 4:00 pm, at Bukolt Park, Stevens Point WI. Adult admission is $2.00. Selling spaces are $2.50 per table or tailgate, and indoor selling areas will be available. There will be food, refreshments, and picnic tables. Talk-in on 146.07/.67 and .22/.82. For further information, contact Frank Guth W9BCC, 1632 Ellis Street, Stevens Point WI 54481, or phone (414)-344-2566, or contact Jim Benak KA9ACE, 1775 Strongs Avenue, Stevens Point WI 54481, or phone (414)-344-5943.

MANASSAS VA
JUN 3

The Ole Virginia Hams ARC, Inc., will hold the tenth annual Manassas Hamfest on Sunday, June 3, 1984, beginning at 8:00 am, at Prince William County Fairgrounds, VA Route 234, ½ mile south of Manassas VA. Admission is $4.00 per person (children under 12 will be admitted free) and there will be no advance sales. Activities will include 25 acres of tailgating (setups at 7:00 am), indoor commercial exhibits, breakfast and lunch menus, a YL program, and CW proficiency awards. Talk-in on 146.37/.97 WA4FPM (Manassas repeater) and 146.52 simplex. For more information, write Hamfest, c/o Ole Virginia Hams ARC, Inc., Manassas VA 22110, or phone (703)-361-9468.

CHELSEA MI
JUN 3

The Chelsea Swap and Shop will be held on Sunday, June 3, 1984, from 8:00 am to 2:00 pm, at the Chelsea Fairgrounds, Chelsea MI. The donation is $2.50 in advance and $3.00 at the gate. Children under 12 and non-ham spouses will be admitted free. Table space is $7.00 per 8 feet (ladies' tables welcome) and trunk sales are $2.00 per space; gates will open for sellers at 5:00 am. There will be plenty of parking, including special parking for the handicapped. Talk-in on 146.52 simplex and the 147.855 Chelsea repeater. For more information, write William Altenberndt WB8HSN, 3132 Timberline, Jackson MI 49201, or phone (517)-764-5785.

PITTSBURGH PA
JUN 3

The 30th annual Breeze Shooters Hamfest will be held on Sunday, June 3, 1984, from 9:00 am to 4:00 pm, at the White Swan Amusement Park, PA Rte. 60 (Parkway West), near the Greater Pittsburgh International Airport. Registration is $2.00 or 3 for $5.00. Sheltered tables for vendors are available by advance registration only. Admission and flea-market spaces are free. There will be food available and activities will include the family amusement park. Talk-in on .28/.88 and 29 MHz. For further information, please write Don Myslewski K3CHD, 359 McMahon Road, North Huntingdon PA 15642, or phone (412)-863-0570.

ROME NY
JUN 3

The Rome Radio Club, Inc., will present the 32nd edition of its Rome Ham Family Day on Sunday, June 3, 1984, at Beck's Grove, Rome NY. Activities will include games, contests, educational and scientific displays and presentations, and a large flea market. Good food and beverages will be available throughout the day, which will be climaxed by a dinner and the Ham-of-the-Year award.

KINGSTON PA
JUN 3

The Murgas ARC (K3YTL) will sponsor the annual Wilkes-Barre Hamfest on Sunday, June 3, 1984, beginning at 8:00 am, rain or shine, at the 109th Armory, Market Street, Kingston (across the river from Wilkes-Barre). Admission is $3.00; children under 16 and XYLs will be admitted free. There will be indoor and outdoor tailgating at $2.00 per space. Setups only will be at 6:00 am and tables and commercial power will be available. Talk-in on 146.01/.61 and .52 simplex. For further information, write Hamfest Committee, PO Box 1094, Wilkes-Barre PA 18703.

SOUTHINGTON CT
JUN 3

The Southington Amateur Radio Association will hold a flea market on Sunday, June 3, 1984, at the Central Elementary School, Main Street (Route 10), just outside Southington Center. Take exit 32 from I-84 to Route 10 south for 1.4 miles. The school is on the right, across from the Public Library. Admission is $1.00. Tables are $7.00 each in advance and $8.00 each at the door (no tailgating); two people will be admitted with each table purchased. There will be over 30 tables of new and used ham equipment, and hot coffee and refreshments will be available. Talk-in on 146.28/.88 and 145.550 simplex. For a table reservation, send an SASE and check (payable) to SARA, PO Box 284, Southington CT 06489.

PRINCETON IL
JUN 3

The Starved Rock Radio Club (W9MKS) will present its annual hamfest on June 3, 1984, at the Bureau County Fairgrounds in Princeton IL. Registration is $2.50 in advance (before May 20) and $3.00 at the gate. There will be a nominal fee for recreational vehicles. Features will include a free swap area, commercial vendor exhibits, an ARRL seminar, and plenty of parking. Good food will be available. Registrants will receive free coffee and doughnuts at 8:00 am. Talk-in on 147.12/.72, 146.07/.67, and 146.52 simplex. For advance registration or more information, send a large SASE to SRRC/W9MKS, RFD #1, Box 171, Oglesby IL 61348, or phone (815)-667-4614.

TERRE HAUTE IN
JUN 3

The 38th annual Wabash Valley Amateur Radio Hamfest will be held on June 3, 1984, at the Vigo County Fairgrounds on US-41, ½ mile south of I-70. Registration is $2.00 each or 3 for $5.00 in advance and $3.00 each at the gate (children under 12 will be admitted free). A covered 12' x 12' flea-market space is $3.00; outdoor flea-market space is free. Some ac and tables will be available on a first-come basis. There will be computer and packet-radio forums, food and refreshments, and overnight camping. A giant shopping mall is located nearby. For tickets and detailed information, send an SASE to WVARA Hamfest, PO Box 81, Terre Haute IN 47808.

DALTON MA
JUN 3

The Northern Berkshire Amateur Radio Club will hold a flea market on Sunday, June 3, 1984, at the Dalton American Legion, Route 9, Dalton MA (near Pittsfield). Admission is $1.00 and a few tables will be available at no charge on a first-come, first-serve basis. A breakfast and lunch bar will be provided by the Dalton American Legion, and free overnight camping will be permitted on a first-come, first-serve basis. Talk-in on 146.91 (Mt. Greylock).

HUMBOLDT TN
JUN 3

The Humboldt Amateur Radio Club will hold its annual hamfest on Sunday, June 3, 1984, at Bailey Park, Humboldt TN. Admission is $2.00. There will be a flea market, ladies' activities, lunches, refreshments, and RV parking. Talk-in on 146.37/.97. For more information, contact Ed Holmes W4IGW, 501 N. 18th Avenue, Humboldt TN 38343.

BOWLING GREEN KY
JUN 9

The Kentucky Colonel Amateur Radio Club will hold its 2nd annual hamfest on June 9, 1984, from 8:00 am to 3:00 pm, at the JC Pavilion at the Southern Kentucky Fairgrounds, Bowling Green KY. Tickets are $2.00 in advance and $3.00 at the door. Features will include an inside and outside flea market, inside displays of new equipment, food, free coffee, and free parking. Talk-in on 146.25/.85 and 146.52 simplex. For further information, write Ed Gann N4HID, Box 92, Route 19, Bowling Green KY 42101, or call (502)-843-8911.

COEUR D'ALENE ID
JUN 9

The Kootenai Amateur Radio Society will sponsor Hamfest '84 on June 9, 1984, from 8:00 am to 4:00 pm, at the North Idaho Fairgrounds, Coeur D'Alene ID. Swap tables will be available at no charge; RVs are welcome but no hookups will be available on site. The annual Friday program will include a pot luck supper and dancing afterwards. For further information, write Avon Anderson WB7WBZ, N. 1035 Highland Court, Post Falls ID 83854.

WILLOW SPRINGS IL
JUN 10

The Six Meter Club of Chicago, Inc., will

hold its 27th annual hamfest on Sunday, June 10, 1984, at Sante Fe Park, 91st and Wolf Road, Willow Springs IL (southwest of downtown Chicago). Registration is $2.00 in advance and $3.00 at the gate. Gates will open at 6:00 am and features will include a large swappers' row, displays in the pavilion, an AFMARS meeting, picnic grounds, refreshments, and plenty of parking space. Talk-in on 146.52 (K9ONA) and .37/.97 (K9ONA/R). For advance tickets, contact Val Heilwig K9ZWV, 3420 South 60th Court, Cicero IL 60650.

NEWINGTON CT
JUN 10

The 1984 Newington Amateur Radio League Flea Market will be held on Sunday, June 10, 1984, from 9:00 am to 4:00 pm, at Newington High School, 605 Willard Avenue (Rte. 173). Admission is $2.00 at the door, tailgating (weather permitting) is $5.00, and tables are $10.00. Dealers may set up at 8:00 am. A portion of the proceeds will be used for the NARL Scholarship Fund. Features will include abundant amateur radio and computer gear, free tours of W1AW and the ARRL Museum (from 10:00 am to 2:00 pm), and TVRO, packet-radio, and ATV demonstrations. Talk-in on 146.52, 144.85/145.45, or 223.24/224.84 MHz. For more information, contact Tom Namnoum KM1O, 55 Spruce Street, Newington CT 06111, or phone (203)-666-1615.

LEWISBURG PA
JUN 10

The Milton Amateur Radio Club will hold their 13th annual hamfest on Sunday, June 10, 1984, from 8:00 am to 5:00 pm, rain or shine, at the Winfield Fire Company grounds on Route 15, south of Lewisburg PA and 8 miles south of exit 30 on I-80. Covered spaces are available. Registration is $3.00 and wives and children will be admitted free. There will be a flea market, an auction, and contests. Talk-in on 146.37/.97 and 145.025/.625. For further details, write Jerry Williamson WA3SXQ, 10 Old Farm Lane, Milton PA 17847, or phone (717)-742-3027.

BELLEFONTAINE OH
JUN 10

Hamboree '84 will be held on Sunday, June 10, 1984, beginning at 8:00 am, at the Logan County Fairgrounds, E. Lake Street, Bellefontaine OH. Ticket donations are $2.00 in advance and $2.50 at the door; tables are $3.00 (no trunk sales). There will be food and plenty of free parking at the fairgrounds. Talk-in on 147.60/.00 and 146.52. For ticket information, write Steve Kidder N8ETD, Box 265, Russells Point OH 43348, or call 1-(513)-843-6099.

DEAL NJ
JUN 10

The Jersey Shore Chaverim will sponsor the third annual Ham & Computer Fest on June 10, 1984, from 9:00 am to 4:00 pm, at the Jewish Community Center, 100 Grant Avenue, Deal NJ (less than 50 miles from NYC and 70 miles from Philadelphia). Admission is $3.00 per person and children under twelve and XYLs will be admitted free. Indoor tables are $8.00 and tailgating spaces are $3.50 each. For reserved spaces, send an SASE and payment by June 1st to Jersey Shore Hamfest, PO Box 192, West Long Branch NJ 07764. Talk-in on 147.045 + .6, 145.110 – .6, and 146.52 simplex. For more information, call Arnold W2GDS at (201)-222-3009.

DAYTON OH
JUN 15–17

The ninth annual MACC Computerfest will be held on June 15–17, 1984, at the Dayton Convention Center. Tickets are $5.00 until May 31st and $6.00 thereafter. Features will include commercial exhibits, a computer and electronics flea market, seminars and mini-courses, a computer film program, a hospitality suite, and contests. For more information, write Computerfest '84, PO Box 24505, Dayton OH 45424.

CORTLAND NY
JUN 16

The 2nd annual SARC Hamfest and Flea Market will be held on Saturday, June 16, 1984, from 8:00 am to 5:00 pm, rain or shine, at the Cortland County Fairgrounds, Cortland NY (Exit 12 off I-81, midway between Syracuse and Binghamton). The donation is $2.00 and jr. ops under 12 and XYLs will be admitted free. Indoor tables and spaces are $3.00 each and undercover (pole-barn) spaces are $2.00 each. There will be indoor and outdoor flea markets, acres of free parking, and refreshments. Talk-in on .52 simplex. For table and space reservations, send a check to Elmer Fuller, Treasurer, 129 Chelsea Twins, Cortland NY 13045. For more details, contact Bud Jackson K2ZER, Skyline Amateur Radio Club, 8 Sunnyfield Drive, Cortland NY 13045.

DUNELLEN NJ
JUN 16

The Raritan Valley Radio Club will hold its 13th annual hamfest on Saturday, June 16, 1984, beginning at 8:30 am, at Columbia Park, Dunellen NJ. Donations for lookers are $2.00 each; sellers' spots are $5.00 each (tables are not supplied). Food and drink will be available at the refreshment stand. Talk-in on 146.025/.625 (W2QW/R) and 146.52 simplex. Advance tickets may be purchased from any club member. For further information, call Jack Fisher W2IWK at (201)-756-2546, or Ted Kopf WB2TKU at (201)-725-3481 between 10:00 am and 10:00 pm.

CROWN POINT IN
JUN 17

The Lake County (Indiana) Amateur Radio Club will hold its 12th annual Dad's Day Hamfest on June 17, 1984, 8:00 am to 2:00 pm, at the Industrial Arts Building at the Lake County Fairgrounds, Crown Point IN. Tickets are $2.50. All events will be held indoors and there will be plenty of parking and food. Talk-in on 147.84/.24 and .52. For further information, contact Bill De Geer W9TY, Hamfest Chairman, 3601 Tyler Street, Gary IN 46408.

FREDERICK MD
JUN 17

The Frederick Amateur Radio Club will hold its 7th annual hamfest on June 17, 1984, from 8:00 am to 4:00 pm, at the Frederick Fairgrounds. Admission is $3.00 and YLs and children will be admitted free. Tailgaters will be charged an additional $2.00; exhibitors' tables are $10.00 for the first and $5.00 for each additional one. Gates will open for exhibitors at 8:00 pm on June 16, 1984, and overnight security will be provided. Overnight parking will be welcomed. For further information, write Jim Devilbiss WA3FUJ, 915 Pine Avenue, Frederick MD 21701, or phone (301)-662-5784.

SANTA MARIA CA
JUN 17

The Satellite Amateur Radio Club will hold its 1984 Santa Maria Swapfest and Santa Maria Style Barbecue on Father's Day, June 17, 1984, beginning at 9:00 am, at the Union Oil Company Newlove Picnic Grounds, south of Santa Maria CA, off US 101. The barbecue will be served at 1:00 pm and tickets are $7.95 for adults and $3.50 for children. In addition to the barbecue, there will be swap tables, contests, and games. Talk-in on 146.34/.94 (WB6IIY/R) and 7230 kHz LSB. For further information, tickets, or swap-table reservations ($3.50 per space), please write Satellite Amateur Radio Club Swapfest, PO Box 5117, Vandenberg Air Force Base CA 93437, and make checks payable to Santa Maria Swapfest.

LAS VEGAS NV
JUN 21–24

The YL International Single Sideband System's annual convention will be held on June 21–24, 1984, at the Sahara Hotel, Las Vegas NV. Deluxe accommodations and RV parking are available for reasonable rates. Planned activities include a tour of Hoover Dam, a Lake Mead cruise, a gala stage show, a cocktail party, a banquet, and a breakfast buffet, as well as the DX forum and business meetings. YLRL ladies are invited to meet Thursday evening, June 21, at 8:00 pm. A convention station will be operating on 14,332 kHz. For complete details and a registration packet, send a business-size SASE (37¢ postage) to Jan Weaver N7YL, 2195 East Camero Avenue, Las Vegas NV 89123.

ELGIN IL
JUN 21–23

The Antique Radio Club of America and the Antique Radio Club of Illinois will hold Radiofest '84 on June 21–23, 1984, at the Holiday Inn, I-90 and Illinois 31, Elgin IL. Antique and classic amateur equipment of all kinds, as well as other vintage radio memorabilia, will be on display and for sale. Amateur-radio participation is welcomed. Talk-in on 146.52. For more details, write Joe Willis, Box 14732, Chicago IL 60614.

LIVONIA MI
JUN 29–30

The Livonia Amateur Radio Club will host the 1984 ARRL Michigan State Convention on June 29–30, 1984, on the campus of Schoolcraft College, 18600 Haggerty Road at Seven Mile Road, Livonia MI (22 miles northwest of downtown Detroit). Schoolcraft is easily accessible via interstates 75, 275, 96, or 94. The Swap-N-Shop will be in the main gymnasium, and one of the two parking lots will be set aside for trunk sales. Major exhibitors will be in the swap area, if requested. Exhibitors' setups will be on Friday, June 29th, from 12:00 noon until 10:00 pm, and the displays will be open on Saturday, June 30th, from 8:00 am until 5:00 pm. There will be security provided on Friday night. For more information, write Wayne W. Wiitse K8BTH, General Chairman, 1984 ARRL Michigan Convention Committee, 14468 Bassett Avenue, Livonia MI 48154.

SWIFT CURRENT SASK
JUN 30

The Saskatchewan Hamfest will be held on June 30, 1984, in Swift Current SASK. Registration will be the evening before. Features will include contests, displays, a ladies' program, and a banquet. For more details, contact the Saskatchewan Hamfest Committee, Box 6, Swift Current SASK S9H 3V5, Canada.

GRAND RAPIDS MI
JUN 30

The Independent Repeater Association of Grand Rapids MI will hold its annual Hamfestival on Saturday, June 30, 1984, from 8:00 am until 4:00 pm, at the Wyoming National Guard Armory, 44th Street, just west of the US-131 expressway. Admission is $3.50. Free table space will be provided to all sellers and dealer setups will be at 6:00 am. Programs will include satellite operations, packet radio, a W5LFL space shuttle movie, an AMTOR forum, a CW rx contest, an antenna forum, and a shack picture contest. Talk-in on 147.165/147.765. For advance table reservations or for more information, call Linda Hurley WD8OHW at (616)-457-1253, or write IRA, 562 92nd Street SE, Byron Center MI 49315.

MAPLE RIDGE BC CAN
JUN 30–JUL 1

The Maple Ridge ARC will host Hamfest '84 on June 30–July 1, 1984, at the Maple Ridge Fairgrounds, 30 miles east of Vancouver. The registration fee is $5.00 for hams and $2.00 for non-hams over 12 years old. Features will include a swap and shop, commercial displays, bunny hunts, and ladies' and children's programs. Food and camper space with electricity will be available. Talk-in on 146.20/.80 and 146.34/.94. For more information or pre-registration (20% off gate fee), contact Maple Ridge ARC, Box 292, Maple Ridge BC V2X 7G2.

OVERLAND PARK KS
JUL 4–7

The Mobile Amateur Radio Awards Club, Inc., will hold their annual convention from Wednesday to Saturday, July 4–7, 1984, at the Holiday Inn in Overland Park KS. There will be a picnic for early arrivals on Wednesday evening, and on Thursday there will be area tours and a dinner theater. On Friday there will be antenna and computer forums, and on Saturday morning the annual business meeting will be held. The hospitality suite will be open during the entire convention. For more information, send an SASE to R. L. Dyson K0AYO, R1, Box 230 M, De Soto KS 66018.

MAHOPAC NY
JUL 7

The Putnam Emergency Amateur Repeater League (PEARL) will hold its 3rd annual hamfest on Saturday, July 7, 1984, from 9:00 am to 4:00 pm, at St. John's School Monsignor O'Brien Boulevard, Mahopac NY. General admission is $1.00, indoor tables are $5.00 each, and outdoor tailgating is $4.00. Talk-in on 144.535/145.135 and 146.52. For advance registration and more information, contact Frank Konecnik WB2PTP, RD1, 244 C, Carmel NY 10512.

FARIBAULT MN
JUL 7

The Faribault Amateur Radio Club will hold its 3rd annual swapfest on Saturday, July 7, 1984, from 9:00 am to 3:00 pm, at Rice County Fairgrounds, Faribault MN. Tables are available only by reservation before July 1st. Talk-in on 146.19/.79. For more information, contact Mike Ferguson N0DGG at (507)-744-5145 after 5:00 pm.

OAK CREEK WI
JUL 7

The South Milwaukee Amateur Radio Club will hold its annual swapfest on Saturday, July 7, 1984, from 7:00 am to approximately 5:00 pm, at the American Legion Post #434, 9327 South Shepard Avenue, Oak Creek WI 53154. Admission is $3.00 per person and includes a "Happy Hour" with free beverages. Parking, a picnic area, hot and cold sandwiches, and liquid refreshments will be available. There will be free overnight camping. Talk-in on 146.94 MHz FM. For more details, including a local map, write South Milwaukee Amateur Ra-

dio Club, PO Box 102, South Milwaukee WI 53172.

ALEXANDER NY
JUL 8

The Genesee Radio Amateurs, Inc., will hold the Batavia Hamfest on Sunday, July 8, 1984, from 7:00 am to 5:00 pm, at the Alexander Firemen's Grounds, Rte. 98, Alexander NY. Admission is $3.00 in advance before June 22, 1984, and $4.00 at the door. The commercial exhibit area will open at 9:00 am and there will be hot-air-balloon rides. Activities will include breakfast at 6:00 am, a CW contest, OM and YL programs, a .52 check-in contest, a flea market, a chicken barbecue, and free camping (electricity is $2.00). Talk-in on 6.52 and 4.71/5.31 (W2RCX). For further information, contact GRAM, PO Box 572, Batavia NY 14020.

BOWLING GREEN OH
JUL 8

The 20th annual Wood County Ham-A-Rama will be held on Sunday, July 8, 1984, beginning at 8:00 am, at the Wood County Fairgrounds, Bowling Green OH. Admission and parking are free. Trunk sales and food will be available. Advance table rentals are $5.00 and are for dealers only. Saturday will be available for setups until 8:00 pm. Talk-in on .52. For more information or dealer rentals, send an SASE to Wood County ARC, c/o Craig Henderson, Box 366, Luckey OH 43443.

SHEBOYGAN WI
JUL 14

The fifth annual Sheboygan County Amateur Radio Club Lakeshore Swapfest and Brat Fry will be held on July 14, 1984, from 10:00 am to 4:00 pm, at the Wilson Town Hall, south of Sheboygan WI. Tables are free and camping is available at Terry Andre State Park. For a flyer and other information, write Julian E. Jetzer KR9S, 6400 Hawthorn Road, Sheboygan WI 53081, or phone (414)-457-3366 after 5:00 pm CDT.

MILTON ONT CAN
JUL 14

The Burlington Amateur Radio Club will host the tenth annual Ontario Hamfest on July 14, 1984, from 7:00 am to 4:00 pm, at the fairgrounds in Milton ONT. Tickets are $2.50 in advance and $4.00 at the gate. Weekend camping, free parking, and free flea-market tables will be available. Features will include indoor commercial displays as well as the traditional events. Talk-in on .21/.81 (club repeater). For more details, contact BARC, PO Box 836, Burlington ONT L7R 3Y7, Canada.

EAU CLAIRE WI
JUL 14

The Eau Claire Amateur Radio Club will hold its annual hamfest on Saturday, July 14, 1984, from 8:00 am to 4:00 pm, at the 4-H buildings in Eau Claire WI. Tickets are $2.00 in advance and $3.00 at the door; tables and coffee are free. Talk-in on .31/.91 and .52 simplex. For more information and tickets, send an SASE to Gene Lieberg KA9DWH, 2840 Saturn Avenue, Eau Claire WI 54703.

AUGUSTA NJ
JUL 14

The Sussex County ARC will sponsor SCARC '84 on Saturday, July 14, 1984, beginning at 8:00 am, at the Sussex County Fairgrounds, Plains Road, off Rte. 206, Augusta NJ. Admission is $2.00. Indoor tables are $5.00 in advance and $6.00 at the door; tailgate space is $4.00 in advance and $5.00 at the gate. There will be food and refreshments and plenty of free parking. Talk-in on .90/.30 and .52 simplex. For further information, write Donald R. Stickle K2OX, Weldon Road, RD #4, Lake Hopatcong NJ 07849, or phone (201)-663-0677.

CHARLESTON SC
JUL 14–15

The Charleston Amateur Radio Society will hold its annual hamfest on July 14–15, 1984, at the Omar Shrine Temple. Talk-in on 146.19/.79. For further information, write Hamfest Committee, PO Box 70341, Charleston Heights SC 29405.

BOISSEVAIN MAN CAN
JUL 14–15

The 21st annual International Hamfest will be held on July 14–15, 1984, at the International Peace Garden between Dunseith ND and Boissevain MAN. Activities will include transmitter hunts, mobile judging, and a CW contest. Excellent camping facilities will be available. For more information, contact William W. Bosch WD0EMY or Stanley E. Kittelson WD0DAJ, Box H, Dickinson ND 58601.

LOUISVILLE OH
JUL 15

The Tusco Amateur Radio Club (W8ZX) and the Canton Amateur Radio Club (W8AL) will present the 10th annual Hall of Fame Hamfest on Sunday, July 15, 1984, at the Nimishillen Grange, 6461 Easton Street, Louisville OH. Admission is $2.50 in advance and $3.00 at the gate. Tables are for rent on a reserved basis. Talk-in on 146.52/.52 and 147.71/.12. For reservations or more information, write Butch Lebold WA8SHP, 10877 Hazelview Avenue, Alliance OH 44601, or phone (216)-821-8794.

LAPORTE IN
JUL 15

The combined LaPorte-Michigan City Amateur Radio Clubs will sponsor their Summer Hamfest on Sunday, July 15, 1984, from 8:00 am to 2:00 pm, at the LaPorte County Fairgrounds, State Road 2, west of LaPorte IN. The donation is $3.00 at the gate. Good food, cold drinks, and paved outdoor parking will be available. For reservations for indoor tables (40¢/foot), write PO Box 30, LaPorte IN 46350.

KUOPIO, FINLAND
JUL 19–22

The Amateur Radio Club of Kuopio will hold the annual hamfest of the Finnish Amateur Radio League (SRAL) on July 19–22, 1984, in Rauhalahti. Activities will include SRAL forums, technical and DX talks,

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GLACIER PARK MT
JUL 20–22

The Great Falls Area ARC will present the 50th annual Glacier-Waterton International Hamfest on July 20–22, 1984, at Three Forks Campground on the southern edge of Glacier National Park. Pre-registration is $8.50 and includes Saturday-night dinner (bring own meat and utensils) and Sunday-morning breakfast. Talk-in on .52 and .34/.94. For more information, send an SASE to Shirley Smith KC7OA, 1822 14th Avenue South, Great Falls MT 59405.

PETOSKEY MI
JUL 21

The Straits Area ARC will hold its annual swap shop and computer demonstration on July 21, 1984, from 9:00 am to 2:00 pm, in the 4-H Building at the Emmet County Fairgrounds. Admission is $2.50 and tables are $3.00 each; setups are at 8:00 am. RV camping will be available nearby. Talk-in on 146.67 and .52. For more details, write Irene Stein KA8NKS, 4487 Robinson Road, Pellston MI 49769, or phone (616)-539-8986.

EUGENE OR
JUL 21–22

The 9th annual Lane County Ham Fair will be held on July 21–22, 1984, at the Oregon National Guard Armory, 2515 Centennial (across from Autzen Stadium), Eugene OR. Doors will open at 8:00 am both days. Registration and swap tables are $5.00 each. Because of limited space, a non-refundable reservation is required for swap tables (maximum: 2). In addition to swap tables, features will include a 2-meter bunny hunt, technical seminars, computer demonstrations, license exams, bingo, a kiddie korner, and women's activities. There will be an all-day snack bar, free parking for RVs (no hookups), and a Saturday pot-luck supper at 6:00 pm. Talk-in on 146.28/.88, 147.86/.26, and on .52/.52. For advance tickets or table reservations, send a check payable to Lane County Ham Fair and an SASE to Tom Temby WB7WPU, Treasurer, 3227 Crocker Road, Eugene OR 97404, or phone (503)-689-1761. Ticket packets may also be picked up at the pre-registration table at the Ham Fair.

WHEELING WV
JUL 22

The Triple States Radio Amateur Club will hold its 6th annual Wheeling WV Hamfest on Sunday, July 22, 1984, from 9:00 am to 4:00 pm, at Wheeling Park. Admission is $3.00 and children 12 and under will be admitted free. Dealers are welcome and tables are available. There will be a flea market and auctions, all under cover. Refreshments and free parking will be available. Talk-in on 146.31/.91 and 147.75/.15. For a four-page brochure with more information and a map, contact TSRAC, Box 240, RD 1, Adena OH 43901, or phone (614)-546-3930.

BEAVERTON OR
JUL 27–29

The Willamette Valley DX Club will hold the 1984 DX Convention on July 27–29, 1984, at the Greenwood Inn, Beaverton OR. For further information, write Bob Herndon W7XN, 607 Andover Place, Portland OR 97202, or phone (503)-232-2740.

HOUGHTON MI
JUL 28

The Copper Country Radio Amateur Association will host the 1984 Upper Peninsula Hamfest on July 28, 1984, at the Memorial Union Cafeteria on the campus of Michigan Technological University, Houghton MI. For further information, write Howard Junkin N8FHF, Co-Chairman, UP Hamfest, 106 West South Street, Houghton MI 49931, or phone (906)-482-4630.

WEST FRIENDSHIP MD
JUL 29

The Baltimore Radio Amateur Television Society (BRATS) will present the BRATS Maryland Hamfest and Computerfest on Sunday July 29, 1984, at the Howard County Fairgrounds, Route 144 at Route 32, adjacent to Interstate 70, West Friendship MD, about 15 miles west of the Baltimore Beltway (695). Table sales are by advance reservation only; indoor tables along the wall with ac are $20.00 each and indoor tables in the center of the floor without ac are $10.00 each. Quantity discounts and booths are available. There will be plenty of outdoor tailgating and RV hookups will be available. Dealer setups begin Saturday at 2:00 pm with overnight security provided. Talk-in on 146.76 (−600), 147.03 (+600), and .52 simplex. For table reservations and more information, write BRATS, PO Box 5915, Baltimore MD 21208, or call Mayer Zimmerman W3GXK at (301)-655-7812.

NASHVILLE TN
JUL 29

The Radio Amateur Transmitting Society will hold the sixth annual Nashville Ham and Computer Fest on Sunday, July 29, 1984, from 8:00 am to 3:30 pm, at the Nashville Municipal Auditorium at the intersection of James Robertson Parkway and Gay Street in downtown Nashville TN. There will be no admission charge and tables will be available for $5.00. For further information, send an SASE to Willie Porter KB4BLL, 4907 Idaho Avenue, Nashville TN 37209.

TRAIL BC CAN
AUG 4

The Beaver Valley Amateur Radio Club will hold a swapfest on August 4, 1984, beginning at 10:00 am, at the Cominco Arena, Trail BC. Talk-in on 146.84/.24. For further information and reservations for table space, please contact BVARC, c/o 3798 Woodland Drive, Trail BC V1R 2V7.

LAFAYETTE IN
AUG 19

The Tippecanoe Amateur Radio Association will hold its 13th annual hamfest on Sunday, August 19, 1984, beginning at 7:00 am, at the Tippecanoe County Fairgrounds, Teal Road and 18th Street, Lafayette IN. Tickets are $3.00. Features will include a large flea market, dealers, and refreshments. Talk-in on .13/.73 and .52. For advance tickets and more information, write Lafayette Hamfest, Route 1, Box 63, West Point IN 47992.

TRUMANSBURG NY
AUG 25

The Finger Lakes Hamfest will be held on August 25, 1984, at the Trumansburg Fairgrounds, 12 miles NW of Ithaca NY. There will be exhibits, a flea market, refreshments, and overnight camping. For

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MARYSVILLE OH
AUG 26

The Union County Amateur Radio Club will hold its 8th annual hamfest on Sunday, August 26, 1984, beginning at 6:00 am, at the fairgrounds in Marysville OH. Tickets are $2.50 in advance and $3.00 at the gate; XYLs and children will be admitted free. A 10-foot flea-market space is $1.00 (no electricity available). There will be food. For further information and tickets, contact Gene Kirby W8BJN, 13613 US 36, Marysville OH 43040, or phone (513)-644-0468.

CHEROKEE OK
AUG 26

The 2nd annual Great Salt Plains Hamfest will be held on August 26, 1984, from 9:00 am to 5:00 pm, at the Community Building on the south side of the Great Salt Plains Lake in north-central Oklahoma. Features will include technical forums, organizational meetings, free swap tables, refreshments, Novice exams, and a noon pot-luck dinner. Overnight camping and RV hookups are available at the Lakes State Park. Talk-in on the 147.90/.30 Salt Plains repeater. For more information, write Steven Walz WA5UTO, Box 222, Cherokee OK 73728, or phone (405)-596-3487.

WINDSOR ME
SEP 8

The Augusta Emergency Amateur Radio Unit will sponsor the 1984 ARRL-sanctioned Windsor Hamfest on Saturday, September 8, 1984, at the Windsor Fairgrounds, Windsor ME. The gate donation is still $1.00 and camping will be available on Friday and Saturday nights. Features will include a flea market, programs, speakers, commercial distributors, light meals, and the traditional Saturday bean and casserole supper. Talk-in on the 146.22/.82 repeater. For further information, contact Don Hanson N1AZH, RFD #2, Box 3678, Greene ME 04236, or phone (207)-946-7557.

SAN ANGELO TX
SEP 8-9

The San Angelo Amateur Radio Club will hold CEN TEX HAMFEST '84 on September 8-9, 1984, in the San Angelo Convention Center. Tickets are $5.00 in advance and $6.00 at the door. Hours for Saturday are noon to 6:00 pm and for Sunday, 8:00 am to 2:00 pm. Special events for the ladies include a Saturday afternoon tour of Fort Concho and Old San Angelo. There will be seminars and group meetings Saturday afternoon and Sunday morning, and a reception for dealers, followed by a social hour for amateurs, on Saturday night. Talk-in on 146.34/.94. For pre-registration or hotel/motel accommodations, write CEN TEX HAMFEST '84, PO Box 3751, San Angelo TX 76902.

AUGUSTA GA
SEP 16

The Amateur Radio Club of Augusta will hold its annual hamfest on September 16, 1984, at Julian Smith Casino Park. Tickets are $1.00 each, 6 for $5.00, or 13 for $10.00. Features will include a flea market in the parking lot, a barbecue, refreshments, dealers, entertainment, and on Saturday evening, a hospitality room at Ramada Inn West, Washington Road, rooms 108-110. Talk-in on 145.49 – 600. For more information, send an SASE to D. F. Miller WB4YHT, Hamfest Chairman, 4505 Shawnee Road, Martinez GA 30907, or call 1-(404)-860-3700.

NEW KENSINGTON PA
SEP 16

The Skyview Radio Society will hold its annual hamfest on Sunday, September 16, 1984, from noon until 4:00 pm, at the club grounds on Turkey Ridge Road, New Kensington PA. Registration fee is $2.00 and vendors' fees are $4.00. Awards will be presented. Talk-in on .04/.64 and .52 simplex.

WICHITA KS
SEP 23

The Wichita Hamfest will be held on September 23, 1984, at Camp Hiawatha, 1701 West 51st Street North, Wichita KS 67204. Features will include a flea market, programs, and commercial exhibits. For more information, contact Norm Tramba WA0HWH, 340 S. 1st, Clearwater KS 67026, or phone (316)-584-6425.

PARAMUS NJ
OCT 14

The Bergen ARA will hold a Ham Swap 'n' Sell on October 14, 1984, from 8:00 am to 4:00 pm, at Bergen Community College, 400 Paramus Road, Paramus NJ. There will be tailgating only; bring your own table. Admission for sellers is $4.00; buyers will be admitted free. Thousands of spaces will be available. Talk-in on .79/.19 and .52. For more information, write Jim Greer KK2U, 444 Berkshire Road, Ridgewood NJ 07450, or phone (201)-445-2855, evenings only.

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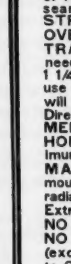

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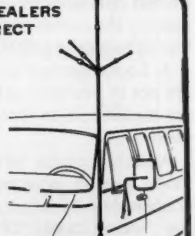

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NEVER SAY DIE
editorial by Wayne Green

from page 6

seem to quickly get lost when emotional factors come up. Let's take a look at what experience has taught us so we won't forget it.

1. In virtually every emergency, the first thing that goes out is the telephone. Storms, rain, fire, explosions, downed planes—either the wires go down or the switching systems bog down and radio is all that's left. This means that in emergencies radio is suddenly going to have to be able to handle an enormous amount of message traffic.

2. With few exceptions, the other radio services are inexperienced in dealing with emergencies, are unequipped to provide the equipment and technical people, can't interconnect with other services, and are unable to provide short-, medium-, and long-range communications. The only service really geared to providing serious emergency communications is amateur radio, and amateurs should plan to be able to intercommunicate with other services so as to help the police and fire departments, for instance, keep in touch.

3. In every emergency situation, the amount of message traffic is vastly beyond the capability of the few available trained operators to handle. This could be solved by developing equipment which does not require trained operators to use and by making the communications as high-speed as is practical.

4. Equipment and skills which are not in everyday use are just not dependable in time of emergency.

A nuclear attack (which is the most serious emergency now conceivable) is what is called the "worst case." Other than hoping that some ham will crawl out of his cellar with an intact HT or mobile HF rig and start from scratch, is there anything we can do? That scenario isn't likely to dissuade Russia from taking advantage of a perceived communications weakness some day.

Would that I could be as blasé about American security as most hams (in other words, just not even think about it) and get annoyed if the subject is brought up.

After working with a group of dedicated hams for several years on this matter of ham emergency communications, certain limiting factors have become evident. One is the relatively small number of active hams we have, particularly younger ones who will have the stamina it will take to survive an attack and set up communications. The other is the dependency on communications which are both inherently slow and depend heavily on difficult-to-learn operator skills.

Amateur radio is so pathetically far behind in technology that there is no real justification for the continuance of the hobby from that viewpoint. Indeed, our leaders have allowed the pressures from old-timers to so influence the hobby that there is little honest justification for the hobby on any basis. One of these days someone is going to say out loud that the emperor has no clothes and we could lose all those nice private frequencies. No more DX pileups. No more traffic nets sending useless messages just to do something. No more rag-chewing. No more repeater clunking. No more repeater wars. No more jamming of nets. No more bands jammed with contesters. No more certificate-hunting. No more ham club meetings with three-hour arguments on what color to paint the clubhouse. What would we do? What would we do?

A generation or two ago there were some strong justifications for amateur radio. Old-timers can remember when the rules and regulations were accepted as fundamental truths. There were four reasons cited in the rules for the existence of amateur radio as a service and for the setting aside of millions of dollars of spectrum space.

We were supposed to provide a supply of trained technicians and operators for our country in time of war. Indeed, without amateurs, WWII would have been much more difficult. But those were the days when amateurs did keep up with technology. Indeed, they were in the vanguard, inventing and pioneering virtually every major new communications technology.

Today, with most new hams going the Bash route, it is unusual to find anyone with even a vague technical background. In the meanwhile, the technology has rushed years ahead of the average amateur. Many of us were working years ahead of the average amateur. Many of us were working with digital communications over 30 years ago, yet these now-old commercial techniques are still not even on the horizon for amateur traffic nets—which are happily brass-pounding away some fifty years behind the times. How many years has it been since amateurs contributed something to communications technology?

Inventing and pioneering are the purview of youngsters and we hams have grown old and cranky. Few of us have been making any effort to get kids involved with hamming. A distressing number of the ham clubs I've visited in recent years seem to have made it a practice to discourage youngsters from joining.

Okay. Perhaps you can see that if there is going to be any realistic emergency communications system established, we are going to have to have a whole lot more hams than we do today—and they are going to have to be younger and livelier. I can just hear the curmudgeons on 75-meter phone huffing and puffing over that.

You know, I get on 20-meter phone as often as I can spare the time, and it is rare that I run into someone who is *not* retired.

You're still wondering how all this fits in with my FCC petition, right? Well, that has a lot to do with the enormous number of comments filed in response to the no-code proposal—mostly by ARRL-member ham clubs. The gist of these comments was quite consistent: No ham should be licensed without Morse-code skills because these are needed for emergency operating. The old theme of "when all else fails, CW will come through" was said so often that one might think there was some truth in it.

Okay. Let's say that whatever that number of hams agree on actually is the truth—by definition. So if we accept as a fact that we must know Morse code for use in emergency times, then it is inescapable that all hams should be able to demonstrate their competence with the code. The basis for not permitting the FCC to set up a no-code license test on 220 MHz was the need for CW skills for emergencies. So, if the hams who inundated the FCC with these statements were not lying, the logical next step was to see that CW skills are maintained. That's called putting up or shutting up.

My proposal cited the no-code responses. I read through the voluminous report from the Commission when the proposal was terminated. I concluded that the only logical reaction to this massive agreement by the ARRL clubs would be some measure to make sure that hams would not allow these critically-important CW skills to deteriorate and thus not be available when needed.

Further, since the dependence upon CW for emergency communications would pretty much rule out the development of high-speed automatic digital communications such as I have been trying to promote for the last thirty years (yes, I know when I'm licked, and we know that the volume of emergency traffic is incredible), amateurs would be doing their hobby and our country a serious disservice if they did not continue to develop their CW skills to some practical speed level.

During WWII, hundreds of thousands of people were taught to copy CW at 35 wpm—FOX, the Navy called it—also the speed which most of the commercial CW services used to use before they were automated about 40 years ago. Obviously, almost anyone can learn to copy at 35 per, so why not set that as a norm?

Sure, I knew that the same chaps who were so vehement about newcomers having to learn code would be the first to scream bloody murder if anyone suggested that sauce for the goose was sauce for the gander.

The cry would be "grandfather!", right?

Oh, I knew that the FCC would turn down the petition, probably with no good reason given. And I was correct. But I did want to hold the FCC's hand in the fire on this one because they got suckered by a bunch of clubs and old-timers into preventing amateur radio from being able to grow with the times.

On numerous occasions, I have written that I'm not at all sure that it isn't too late to save amateur radio now. A no-code license might have helped, as it did in Japan. But there it hit big so that they have about three times as many licensed amateurs as we have, and with only half our population. Odd, isn't it, that Japan is graduating seven times as many electronic engineers as we are? I wonder where they are coming from? Does anyone have an idea?

Are we going to be able to put together anything significant in the way of an emergency communications system which might possibly survive a nuclear attack? So far, I see not even a hint of hope for this. We need a massive influx of youngsters. We need to get cracking on developing already-known technology so we can have high-speed error-correcting communications which anyone can operate. We need a million new hams, all with the energy and enthusiasm to make all this happen.

I'm still trying to get the concept of ham clubs back into our high schools. I'm working on a high-tech college. My ideas are beginning to be accepted, so we'll see what happens.

Now, about the code. If you really, honestly believe that it is important, then you must agree with me that it is every bit as important to make sure that this key skill is not permitted to deteriorate through disuse. This means retesting.

If you don't agree about retesting, what other way is there to look at it except that code is not critical to getting a ham license? So, are you for code for others, but not you? Code for all? Or no-code for all? Your deal.

WIN WAYNE'S HAMSHACK SWEEPSTAKES WINNERS

GRAND PRIZE:
ICOM IC-751 HF TRANSCEIVER/ GENERAL-COVERAGE RECEIVER
Raymond J. Hornick W3QJA
310 Pearl St.
Mars PA 16046

FIRST PRIZE:
TEN-TEC CORSAIR HF TRANSCEIVER
Harold C. Tingey W2LT
250 Prospect Rd.
Horseheads NY 14845

SECOND PRIZE:
ICOM R-70 SYNTHESIZED GENERAL-COVERAGE RECEIVER
Harold J. Estok W6JIP
4475 Landis St.
San Diego CA 92105

THIRD PRIZE:
COMMODORE VIC-20 COMPUTER, KANTRONICS INTERFACE HARDWARE AND HAMSOFT SOFTWARE
Elmer L. Tripp WA4IUU
512 East Ave.
Ayden NC 28513

FOURTH PRIZE:
MULTI-BAND ANTENNAS SPIDER MOBILE ANTENNA
Richard F. Bailer W0JUD
4849 Fairlawn Ct.
Boulder CO 80301

FIFTH PRIZE:
AEA MOSCOW MUFFLER
William A. Baker K1KOL
POB 131
Newton NH 03858

PRIZES 6-50:
BOOKS

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6709 37th NW
Seattle WA 98117

Richard H. Ashton KA6ZRZ
22826 Latigo Dr.
Laguna Niguel CA 92677

Eugene W. Clark W2HTA
50 Broad Brook Rd.
Ashuelot NH 03441

Ellen C. Ballard KA8LEB
Rt. 1
Sherwood OH 43556

Hubert C. Cox W4PXZ
1230 South Orlando Ave.
Cocoa Beach FL 32931

Wayne E. Nelms
111 N. Cameron St.
Sterling VA 22170

Craig A. Packard WA1BXP
8201 Corporate Dr.
STE 250
Landover MD 20785

John P. Winn WB7DXC
6170 SW 179 AVe.
Beaverton OR 97007

D. I. Murdock K4DVI
8500 Contoura Dr.
Orlando FL 32810

David L. Cave WA7PBM
2344 E. Aspen
Tempe AZ 85282

John S. Anderson KA2BCR
45 Colonial Lake Dr.
Lawrenceville NJ 08648

Alpheus W. Russell W6TFT
2505 Hopkins Ave.
Redwood City CA 94062

Gregg E. Wentworth WD5CNM
PO Box 4282
College Station TX 77844

Ronald A. Wynner WA6WLZ
4466 Stansbury
Sherman Oaks CA 91403

Gary G. Altman K4NNK
704 Windy Way
Signal Mountain TN 37377

Harold W. Paul W7ADK
1002 Buckboard Blvd.
Papillion NE 68046

Jeffrey A. Kato KD5VF
5719 Fair Forest Dr.
Houston TX 77088

Steve C. Ramey WH6AUL
3722C Porter Lp
Wahawa HI 96786

Laurie M. Tsuda KB6AFI
5600 Kingston Wy
Sacramento CA 95822

Robert H. Drexler WA3ZOE
901 Eighth Ave.
Conway PA 15027

Charles B. Church WB7VYV
Highwood MT 59450

Allen J. Schiavoni W3GEV
3107 Brighton St.
Philadelphia PA 19149

John A. Magenheim WA9CPR
8681 No. 60th St.
Milwaukee WI 53223

Dwain A. Kinard
2907 Redford Dr.
Owensboro KY 42301

Harold F. Sturn
2412 Jim Lee Rd.
Tallahassee FL 32301

Jerry L. Baker KB4DSN
Rt. 3
Box 65
Thomasville GA 31792

John F. Loriaux WB6TBG
7687 Foothill Blvd. 101
Tujunga CA 91042

Mathias Hettinger KA1JNU
10 Cheyenne Rd.
Oxford CT 06483

Michael Baker K0QZ
9032 W. Ironwood Dr.
Peoria AZ 85345

Stanley J. Rykwalder W8AUS
23819 Lynwood Dr.
Northville MI 48169

John W. Grigsby KA8KVA
281 E. 208th St.
Euclid OH 44123

Steven P. Dominguez WA6LKS
9134 Rancho Real
Temple City CA 91780

Billy R. Bullard KA4LHU
122 Partridge Rd.
Wilmington NC 28403

Raymond G. Terry KG1P
51 N. Brownell Rd.
Williston VT 05495

Clement S. Simon WA7RHN
3355 SE Emelia Ln.
Port Orchard WA 98366

Fred L. Steers WB7SZK
POB 6491
San Diego CA 92106

John C. Lovci W6JFY
1947 Stearniee Ave.
Long Beach CA 90815

Richard D. Leblanc
193 Lakeway Dr.
Pittsfield MA 01201

Glen A. Jenkins
19398 W. Missouri
Tucson AZ 85714

Earl C. Wolf K8VDH
6713 Devonwood Dr.
Cincinnati OH 45224

Robert A. Graham KA5QEY
5006 Justin Dr. NW
Albuquerque NM 87114

Milton Torres KP4ENT
PO Box 699C
Candsanas PR 00629

Donald H. Holmes W9MYB
7220 Creekside Ln.
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Send payment with order OR, call for faster service (have charge card number ready).
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NEW PRODUCTS

COM-RAD'S NEW "UNTENNA"

Development of a new low-profile, vertically-polarized Untenna™ designed to outperform conventional whip antennas more than ten times the height has been announced by Com-Rad Industries of Buffalo NY.

Height reductions of 80% and more alleviate damage caused by garage doors, underground ramps, trees, drive-in or service-station canopies, and other clearance hazards, the company states.

According to Com-Rad, Untennas will benefit a wide range of mobile, portable, and fixed radio users including common carriers, and public-safety, wireless-security-system, government, military, forestry, marine, aircraft, and business/industry vehicles.

Com-Rad reports that, because of Untenna's rigid construction, mobile flutter or "picket fencing" is eliminated, resulting in base-station-quality transmission. Quieter reception with less adjacent-channel interference (intermod) is cited, and gained through Untenna's high Q design. Made of stainless steel, aluminum, phosphor bronze, and chrome plate, each antenna is noted to be highly resistant to corrosion. Unlike whip antennas, the Untenna may be enclosed in an optional weather resistant, high-impact plastic cover (Radome), which is useful also in disguising the antennas.

Untenna is currently available in five models to serve frequency ranges of 25–40, 45–85, 140–170, 210–240, and 430–470 MHz. Combination, single-feedline models to serve multi-frequency requirements are also available.

Complete information is contained in a new, illustrated bulletin available from *Com-Rad Industries, 25 Imson Street, Buffalo NY 14210.* Reader Service number 480.

HAMTRONICS GAASFET RECEIVER PREAMP

Hamtronics, Inc., has just announced a new low-noise preamp, using a new dual-gate GaAsFET recently designed especially for service in the VHF/UHF bands. Up until now, to get the low-noise figure of a GaAsFET, a designer had to adapt a transistor really intended for microwave service. They work well, but they cost more and the devices tend to oscillate because they have so much gain at the lower VHF and UHF frequencies. Also, being single-gate devices, they tend to have the characteristically high feedback capacitance associated with triodes. This makes them hard to tame under a wide variation in load impedances.

The new LNG-( ) series of preamps solves these problems, providing good gain, moderately low noise figure (0.7 to 0.8 dB, depending on band), and low cost. The LNG-( ) series preamps cost much less than the earlier type of GaAsFET preamps. GaAsFETs typically give a wide dynamic range for good overload characteristics, and this unit is no exception. Additionally, the new dual-gate devices used in the LNG have built-in diode protection to reduce the chance of damage due to static and transients. Units operate on standard +12 to +14 V dc, and they are easy to tune. The case allows for easy mounting anywhere, including the tops of towers. LNG preamps are available for all ham bands, 10 meters through 450 MHz.

For more information, including a free catalog on other Hamtronics products, contact *Hamtronics, Inc., 65 Moul Road, Hilton NY 14468-9535; (716)-392-9430. (For overseas mailing, please send US$2.00 or 4 IRCs.)* Reader Service number 482.

HAMWARE PROGRAMS FOR THE VIC-20

Three new HAMWARE programs by John Vesty Company are said to extend the utility of VIC-20 computers to logging and QSO operations.

HAM LIST serves as a memory jogger during a QSO, quickly searching for a call and displaying data on file. The program provides for the convenient addition, revision, or deletion of entries, and a screen-review of the list.

QUICK LOG provides automatic logging of date and time, and search by call or QTH. The list can be printed, saved to tape, or screen-reviewed as desired. Time is displayed on the menu page.

QSO MANAGER combines a ten-minute identification timer and a 24-hour clock, with a screen-based notepad for use during a phone or CW QSO. The notepad incorporates a word-wrap routine to eliminate broken words at the end of a line. The timer can be set, reset, or cancelled at any time.

The three programs are available on tapes, and are designed for use with both unexpanded and expanded VIC-20 computers. Capacity of the logging programs ranges from 100 to 700 entries maximum, depending on the memory expansion used and the length of individual entries.

For further information, contact *John Vesty Company, 415 Elm Street, Fayetteville NY 13066.* Reader Service number 483.

LARSEN INTRODUCES CELLULAR ANTENNAS

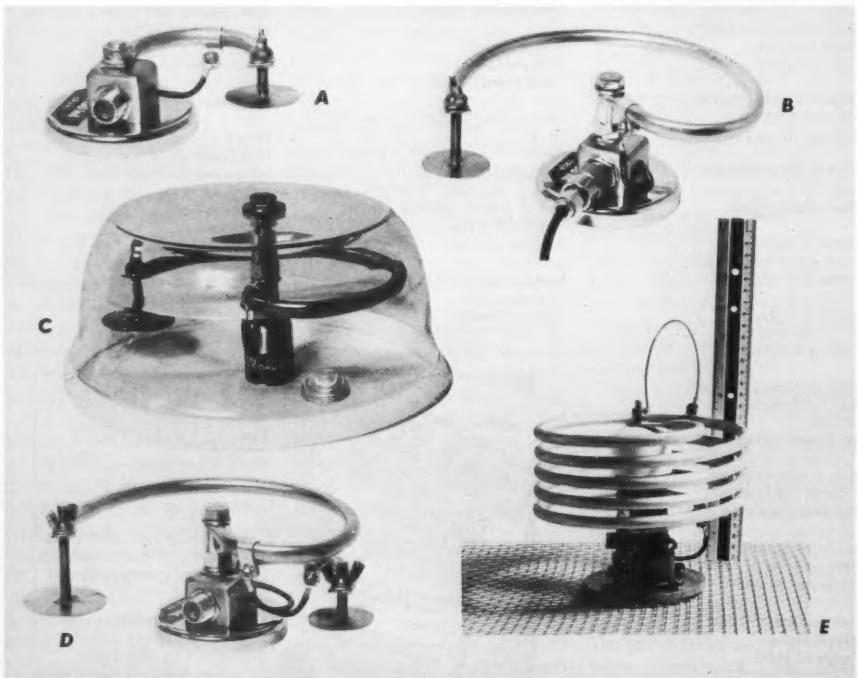
Larsen Electronics has introduced a new line of cellular antennas with a wide choice of cosmetic and mounting options. The Larsen CM series is available in gain and quarter-wave models.

The new CM-825 5/8 over 1/4 wave features an open-coil design that delivers 3-dB gain and a 90-MHz bandwidth. The base is chrome plated, while the whip has the exclusive Kulrod plating. The BCM-825 offers the same electrical configuration with a Teflon™-coated base and rod. Both are shipped with black and white plastic bases to give customers a cosmetic choice.

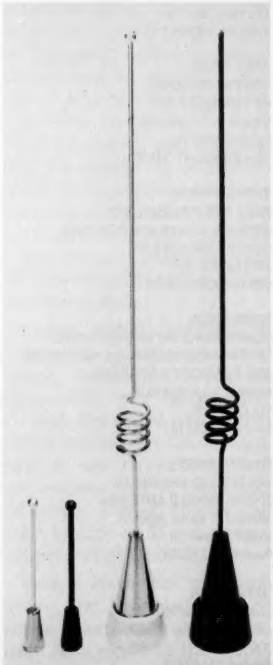
Larsen also offers CM-series quarter-wave antennas with chrome (CMQ) and black Teflon (BCMQ) finishes. The quarter-wave models provide a 90-MHz bandwidth and deliver unity gain with a compact 3" whip.

Larsen's new cellular system offers a choice of weatherproof mounting options. The CM-K/CM-B permanent mount requires a 3/4" hole or the antenna may be mounted temporarily with a mag mount or trunk-lid mount. All are available with RG-58/U or Teflon TFE low-loss coax and TMC connector. The CM permanent mount also is available with low-loss AA-3096 coax and TMC connector mount. Other connector types are available.

For more information, contact *Larsen Electronics, PO Box 1799, Vancouver WA 98668; (206)-573-2722.* Reader Service number 485.



Com-Rad Industries' Untennas. A. Model CR4A, 450–460 MHz; B. Model CR2A, 140–170 MHz; C. Optional Radome Model CR2RD (fits Untenna Models CR2A, CR3A, CR2/4A); D. Model CR2/4A dual-function, multi-frequency Untenna, 140–170 MHz, plus 440–460 MHz; E. Model CR109A helical, 29–35 MHz.



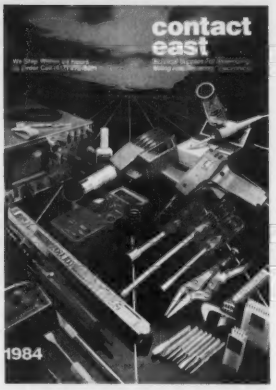
Cellular antennas from Larsen Electronics.

CONTACT EAST FREE 1984 CATALOG

Contact East is offering a free 1984 Electronic Tool and Test Instrument Catalog featuring over 5,000 quality technical products for assembling, testing, and repairing electronic equipment. This is an excellent buying guide for engineers, technicians, and researchers.

Products include precision hand tools, test instruments, tool kits, and soldering supplies, plus a new, full selection of static-control products. All products are fully illustrated with photographs, detailed descriptions, and pricing to allow for easy ordering by phone or mail. Most orders are shipped within 24 hours and carry a 100% satisfaction guarantee.

The Contact East 1984 Catalog is available from *Contact East, 7 Cypress Drive, PO Box 160, Burlington MA 01803; (617)-272-5051.* Reader Service number 478.



Free Contact East catalog.

S. E. CORPORATION'S PROTOTYPING BOARD

The "eZ Board" is a solderless experimenter system which provides a time-saving and convenient method for building experimental add-ons to interface with personal computers.

Features include a high-quality glass epoxy printed circuit board mounted with a set of solderless breadboarding units for building circuits. Four separate distribution buses with 50 tie points each can be used for power, ground, clock lines, reset commands, and more. A four-position DIP switch is mounted on the board. Each switch position connects to a set of tie-point-block sockets on either side, to aid in the development and analysis of experimental circuits. A flat ribbon cable connects the board to the computer's bus-expansion slot.

The breadboarding area consists of 1460 tie points with a capacity of sixteen 14-pin DIPs. Components with lead diameters of up to .032 simply plug in and are connected with ordinary solid hookup wire.

The board will be very useful in R & D for engineers, hobbyists, and students who wish to build their own interfaces to computers. It aids in understanding the operation of a computer's bus system and provides the function of each output terminal of the bus for use in developing add-on circuits for interfacing to a computer.

Models IPC, APC, and CPC are available for IBM-PC, Apple, and Commodore and all other hardware-compatible computers of the same type. Models for other computers will be introduced during 1984. International patents are pending.

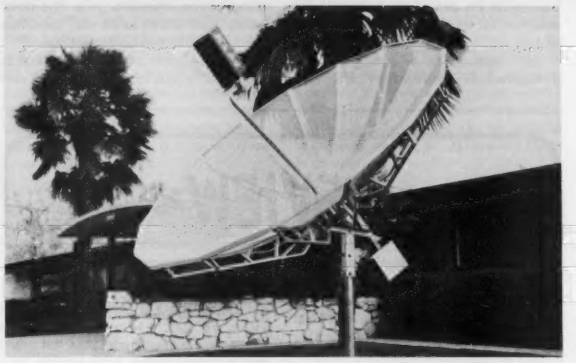
For further information, contact *Mr. Rahim Sabadia at S. E. Corporation, PO Box 1132, Yorba Linda CA 92686; (714)-630-9335.* Reader Service number 476.

AMATEUR RADIO GETS ITS VERY OWN GAME!

The Dayton Hamvention 1984 saw release of Amateur Radio's first official game product, called Hamfest!® 1984. It is produced and distributed by QCD Marketing Services, a division of QCD Publications, Inc., which publishes the ATV journal, *A5 ATV Magazine.*

Hamfest! has its own game, colorful game board, dice, money, and drawing cards. Players move around the game board buying as much ham-radio-type equipment as they can afford while trying to advance themselves from Novice- to Extra-class FCC license. Along the way, there are helping QSL cards and penalty QRM cards. Two squares are designated FCC test areas from which each player draws special FCC cards to determine whether or not he studied hard enough to pass to the next grade license. An additional two squares designate Hamfest locations from which all players begin a trade/buy/sell limited time period. There is a bank and retail store with the first player reaching the Extra-class status declared Super Ham and the winner!

Hamfest! is available at most ham-radio retail dealers or is available direct from *QCD Marketing Services, PO Box H, Lowden IA 52255; (319)-944-5421.* Reader Service number 484.



The KLM Electronics, Inc., satellite Mini-X dish.

KLM'S SATELLITE MINI-X DISH

KLM Electronics, Inc., has announced the introduction of its new Mini-X satellite TV antenna, a parabolic dish with an 8-foot diameter to meet the needs of home or commercial users with limited space.

The Mini-X is the third entry in KLM's line of modular, radar-mesh, parabolic dishes. Its modular design permits fast shipment and easy assembly even by amateurs using simple tools. The smaller, lighter, Mini-X can be assembled by two people in 1½ hours or less or by 1 person in about 2 hours.

The Mini-X employs the same basic modular design as KLM's X-11 and X-16 antennas, with the same survival capabilities against the elements, including the ability to withstand 100-mph winds. It has 16 ribs compared to 24 for the 11-foot X-11.

The Mini-X operates at 55% efficiency, like the X-11. Its f/d ratio is .34 compared with .47 for its larger cousin. It is available with a low-cost, manual-type mount or with a KLM polar mount and tangential drive compatible with KLM motor drives. The Mini-X can be ordered in dark green, black, or brown.

For further information, contact *KLM Electronics, Inc., 16890 Church Street, Morgan Hill CA 95037; (212)-986-6668.* Reader Service number 479.

ELECTRONIC SPECIALISTS' HAM GEAR PROTECTION

Protection and interference control products are presented in a new 40-page catalog from Electronic Specialists. Costly damage from lightning or power-line spikes can be prevented, and disruptions or interference from power-line-carried EM1 and RF1 can be controlled. Protective devices for ham gear include ac line-voltage regulators and conditioners, modem and phone-line surge suppressors as well as equipment isolators and filter/suppressors.

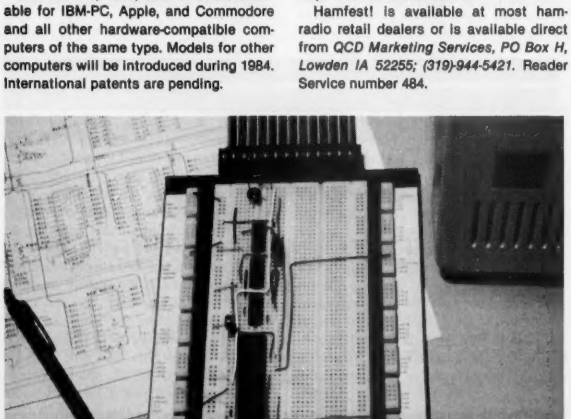
Typical protection and interference problems are described, together with suggested solutions for various ham and communication installations. Catalog 341 also describes numerous applications for hi-tech equipment protection and interference control.

For further information or to obtain, write *Electronic Specialists, Inc., 171 South Main St., PO Box 389, Natick MA 01760; (800)-225-4876.* Reader Service number 481.

THE MCM ELECTRONICS DMM/DCM METER

MCM Electronics, a parts and accessories distributor to the electronic service industry, has introduced the Tenma combination DMM/DCM meter with hFe transistor-gain tester. Users can easily read voltage, current, resistance, capacitance, and hFe on the clear ½-inch, 3½-digit LCD display. It saves time and money by eliminating the use of both a conventional capacitance and a multimeter.

Lightweight and compact for use in the



The eZ prototyping board.

Electronic Specialists' catalog of ham gear protective devices.

The MCM Electronics DMM/DCM meter.

field or on the bench, the meter's in-line push-buttons allow for easy one-hand operation.

The capacitance-measuring socket gives direct measurements of capacitors, along with a transistor hFe. The color-coded panel allows users easy identification of function and range settings.

Safety features include input overload protection, single fusing (with spare fuse inside), and stress relief test leads. The Tenma combination DMM/DCM meter comes in a convenient carrying case, with alligator-clip hFe leads, and has a one-year warranty. Battery-operated, the LCD display indicates low battery condition. To get further information or to order, with 24-hour delivery, call toll-free *(800)-543-4330 (in Ohio, (800)-762-4313).* Reader Service number 477.

REVIEW

TRIO-KENWOOD TW-4000A

Trio-Kenwood unveiled the TW-4000A at the 1983 Dayton Hamvention, and that is where I got my first look at one. The model on display had the optional VS-1 voice synthesizer installed, and after a few minutes playing time, I decided that I had to have one. In fact, I didn't get around to purchasing one until that fall. The local ham-radio store, R & L Electronics, let me play with a powered-up unit and demonstrated features and the various options that they stocked. I'm sorry, but you just can't get that kind of service through an 800-number purchase. I ended up going home with the TW-4000A, the VS-1, and the MA-4000 dual-band mobile antenna.

The "FM Dual-bander," as Kenwood likes to call it, is just that. Capable of transceiving on either 2 meters or 440 MHz, it outputs a respectable 25 Watts on both bands. It is one of the very few rigs on the market capable of more than 10 Watts output on 440. My own unit actually measured about 30 Watts on both bands with a Bird® wattmeter.

A long list of other main features includes: a large, easy-to-read liquid-crystal display, an included MC-48 touchtone™ microphone, battery backup (nice when you take that rig into the house at night), priority watch which switches the receiver back to channel one for one second out of ten to watch for calls, and dual vfo's.

The TW-4000A has three main options available. These include the VS-1 voice synthesizer, the TU-4C Continuous-Tone Coded Squelch System (CTCSS) tone encoder, and the MA-4000 dual-band mobile antenna. The VS-1 voice-synthesizer board came in a painfully small box but included a complete set of instructions for installation and use (in two languages). English and Japanese, as if you hadn't guessed. Installation went smoothly, as per instructions, and left me with an excess board containing the previous beeper circuitry. I kept mine...I don't know why. The VS-1 speaks in two languages (go ahead, try to guess) at three speeds. The English voice has an accent of distinctly Japanese female extraction, but it is easily understood. The flip of a switch gives you the same vocabulary in Japanese, to the great delight of guests and children. Watch out for those kids, though; it takes them only a short while to pick it up and they'll be driving you nuts in Japanese. A switch is located on the bottom of the rig that allows you to turn off the voice synthesizer when desired. This is an important feature when on long trips and the XYL is trying to sleep or when she's driving and you want to wander the band without distracting her.

The MA-4000 dual-band antenna is an interesting affair. On 2 meters it is a center-trapped 5/8 wave. On 440 MHz, however, the trap phases two ½ waves in collinear form. Yeah, I know. You've gotta see it. The base of the antenna contains the equivalent of a PL-259. This unique feature raises all kinds of interesting mounting possibilities...and problems. A magnetic mount is available and it is quite strong. Personally, I am a fervent believer in permanent-mount antennas but could find no mount of that configuration. So, I improvised. Those who cringe at the thought of drilling holes in an automobile body should shield their eyes. I found a slightly-longer-than-usual SO-239 socket, drilled a hole in the center of the roof to fit, and tightened a nut down on an "O" ring purchased from a local hardware store. This arrangement has served me faithfully with no leaks for six months. The TU-4C programmable tone encoder is also accessible from the bottom of the radio and allows the setting of one tone each for both VHF and UFH. The TU-4C will generate any of the 37 standard subaudible tones by setting a DIP switch according to the chart included in the owner's manual.

Now a word about whistles and bells. You know, those little features that make or break the long-term ownership of the rig. The dimmer switch dims the display for night driving (you'd be amazed at how bright it is otherwise!). The "scan" feature is always nice when you're bored or on the open road. "Skip" allows the memory scan to bypass unwanted channels. "Reverse" lets one check the input of a repeater to assess simplex possibilities. The microphone-monitoring feature provides a visual indication on the liquid-crystal display as to whether or not your mike or touchtones are working. The owner's manual is extensive and quite complete.

Then comes my pet peeve with many rigs—the included schematic. The schematic diagram that comes with some rigs is either so small that you need a photo enlarger to read it or is spread among several pages of a booklet, preventing easy interpretation. The person that drew the schematic for the TW-4000A should get a pat on the back and a raise. Drawn on both sides of a nice big 16" × 23" sheet of paper, it is well marked and easy to read. The interconnect lines are spaced 60 thousandths of an inch. This is a considerable improvement over the more common 20-thousandths spacing, especially when ten or so of these lines run parallel for any distance. The PLL unit and MC-48 microphone are drawn on the back in nice open lines. Regrettably, as with many other Kenwood radios, no schematic diagram of the microprocessor unit is provided. For those that never work on their own radios, this is of little consequence. Each of these features by itself is not enough to recommend a radio, but altogether they are a formidable package.

The Kenwood TW-4000A is far and away the best mobile rig I've ever owned and, for the person interested in FM only, it makes a very respectable home station as well.

For more information, contact *Trio-Kenwood Communications, 1111 W. Walnut, Compton CA 90220.*

Robert W. French II N8EHA
Lewisburg OH

THOMPSON SOFTWARE MORSE-CODE TRANSLATOR

Outstanding. That is my overall assessment of the new program offered by Thompson Software. The Morse-Code Translator decodes CW and scrolls the output from right to left on a single line across the monitor screen. Input is direct from the receiver headphone jack to the Timex 1000 computer earphone connector. No terminal unit, hardware modifications, or special attachments are needed. What's more, the program also generates CW and sends it via the microphone connector. The best part (aside from the price) is that the program fits into the 2K memory of the unexpanded Timex 1000. I have not tried the program in the Sinclair ZX-81 or the Timex 1500; however, due to their similarity to the model 1000, I suspect that there would be no compatibility problems.

The translator decodes letters, numbers, and 18 other characters (such as $\overline{AR}$, comma, period, etc.). To use the program, load the cassette in the normal fashion; the program is self starting. A brief copyright notice appears on the screen and then the receive mode, shown in Fig. 1, appears. By entering a period, the screen switches to the format in Fig. 2, the code-speed input. Once selected (the range is 9 to 100 wpm), the screen switches to Fig. 3, which gives the option of sending or receiving.

I have confined myself to CW reception; sending requires an audio amplifier connected to the computer microphone port. Reception has been a very pleasant surprise. The computer does an excellent job of scrolling the translated CW on a single line, a total of 32 characters wide.

I listened on 15, 20, 40, and 80 meters and found the reception very good even in noisy situations. My receiver was a Ten-Tec Argonaut with a Murch dipole. I then switched to my Sony ICF 2001 to poke around the SW bands, looking for commercial and government CW stations. I found several and had no trouble with the translating. Computer-generated noise was barely noticeable on the Ten-Tec but was somewhat obtrusive on the Sony. Reception was always very good when proper CW spacing was found. Sloppy fists resulted in the scrolling of various "E" and "T" characters. The old adage, "garbage-in, garbage-out," is very clearly demonstrated in the Thompson Translator. See Fig. 4 for a sample of the output when in the receive mode.

The program has been copyrighted and cannot be discussed in any detail. However, it is similar to many other Timex 1000 CW programs previously published in both *QZX* and *QEX* newsletters. The first line is a REM statement that contains the machine language. Typically, ML is loaded by means of a short routine that is subsequently deleted before using the program:

```
FOR I = 16000 TO 17000
INPUT N
POKE I,N
NEXT I
```

The balance of the program is devoted to the formatting of the screen, selecting the CW speed variable, and various timing and USR commands. This is an elegant little program that does a great job with little memory.

Why use the Timex 1000 computer for CW reception when there are so many alternatives? My reason is the low cost of the unit. Available options include a dedicated microprocessor like the HAL RTTY unit or a code reader like the Microcraft CODE*STAR or an MFJ terminal unit for a home computer. All of these cost far more than my calculator-sized Timex. Originally priced at $150, this computer can now be purchased for as little as $9.95 on special sales. With something like 750,000 units in circulation, it should be no problem to acquire one secondhand. I bought mine for $15.00 at a flea market.

There are several options for CW reception with the Timex 1000. The cream of the crop is the "CWSS" split-screen CW transceiver package that includes a program and hardware from NU4V. Priced at $90, this unit is reported to be an excellent performer. It comes in a kit that must be assembled and plugged into the rear of

Fig. 1.

```
ENTER SPEED IN WPM (9 TO 100)
```

Fig. 2.

```
SPEED = 20 WPM        "" TO RECEIVE
```

Fig. 3.

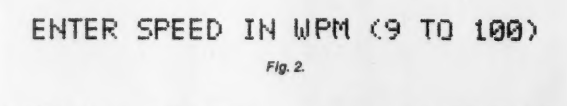


Fig. 4.

the computer. A simpler method requires a knowledge of transistor-to-transistor logic and the assembly of a terminal unit. This can be connected to pin 20 of IC1 of the Timex computer, and with the right software, it will do a good job of receiving CW. I zapped an IC with some ill-advised modifications of this sort. Static electricity does not mix with ICs very well. The Thompson Translator ($9.95) is the cheapest solution that I have encountered. Input via the microphone port is directed to pin 20 of IC1 without requirement of major surgery on the computer.

All in all, I give very high marks to the Thompson Software CW Translator and recommend it without reservation. I hope that the Thompson staff is hard at work on a RTTY program. Both programs would be welcome additions to Timex software libraries. For further information, contact *Thompson Software, PO Box 1266, Lombard IL 60148.* Reader Service number 486.

Thomas Hart AD1B
Westwood MA

REGENCY Z30 SCANNER

The Regency Model Z30 is a full-feature scanner that should appeal to those requiring maximum operator flexibility. Covering the three FM bands, the Z30 features 30 programmable channels and a host of features provided by microprocessor control. A clock and alarm clock are included. Although designed for home use, the monitor can operate in a mobile environment using a provided 12-V power connector. A telescoping antenna is included with the unit, and although fine for normal use, a connector is provided for an external antenna.

As soon as I unpacked the Z30, I was impressed by the layout of the controls. Unlike some devices with keys so small a pencil tip is required equipment, the Regency features a full-size, 24-key touchpad and power, volume, and squelch controls. Setting frequencies is a snap. Programming the frequency of a local repeater was accomplished by first depressing the MANUAL button. A loud "beep" announces contact closure in no uncertain terms. The display (of the bright-green vacuum-fluorescent type) indicates the channel number being programmed—in my case "CH 01". The desired frequency is then entered digit by digit on the keypad. Any programming mistake is easily fixed by using the CLEAR button and reentering the numbers. I managed to correctly enter 147.375. Depressing ENTER associates the channel and frequency. No band-switching is required, as any frequency within the three bands can be associated with any channel. All 30 channels are programmed in similar fashion. A DISPLAY button allows the user to immediately identify any of the 30 possible channel-frequency relationships. Any errors or incorrect control sequences are indicated by English-like error messages created by the microprocessor.

The Z30 supports all popular scanner functions. Hidden frequencies within a band are isolated easily using the SEARCH function. The upper- and lower-frequency ranges of the search are entered using multipurpose keys. After depressing SCAN, any reception within the bounds locks the receiver and the frequency is displayed. Two options may then be employed. If you are like me, it takes a few moments to write down a new frequency. A DELAY function causes the Z30 to hold for four seconds after carrier disappears before scanning is resumed. If you like what you hear on a new channel, depressing HOLD keeps you there. Searching is terminated at any time by using any other function key.

A favorite channel may be checked every two seconds for activity by programming it into CH 01 and activating the PRIORITY function with a single keystroke. A simple scan of preprogrammed channels is initiated by depressing SCAN. A DELAY option holds each reception for two seconds after transmission to allow responses to be heard. A single channel is continuously monitored by selecting the CH with the MANUAL button.

All in all, I found the Regency Z30 easy to set up and understand. Regency did not overlook receiver performance in this design. Some of the allband, fully-synthesized machines function well on one band and suffer on others. Since the Z30 owner's manual actually published specifications for the bands 30–50 MHz, 144–174 MHz, and 440–512 MHz, we decided to check some of them. A friend who is a repeater owner/operator provided the equipment and expertise required to run accurate tests. Receiver sensitivity (12 dB Sinad) exceeded the published figures of .35 uV at 40 MHz, .4 uV at 160 MHz, and .5 uV at 465 MHz by comfortable margins. Operating a 2-meter hand-held in the same room did not cause the entire middle band to go dead. Squelch action is crisp and the audio quality is acceptable. A list of synthesizer "birdies" is provided in the owner's manual. On my sample, some were present, but at least the owner is forewarned.

The Z30 package is rounded off with a programmable time-of-day clock and alarm clock. These clocks are programmed via the keypad. The alarm, when it sounds, is very loud, unmelodious, and guaranteed to wake up anyone. (I'll bet on that!) A DIM switch allows the normally-bright display to be dimmed or turned off altogether at night. A capacitor backup system is claimed to hold all programmed functions for a week when ac power is absent. I didn't test this function as I play with my Z30 daily, but no data was lost while transferring the unit to my car.

I have two units with the Z30. The base plate for the touchpad is a baked, metallic-brown color. The numbers and functions printed by the keys are almost unreadable under dim or indirect illumination. The "beep" tone used to verify key closures and for the alarm clock is unnaturally loud and harsh. However, the features and performance of the Z30 outweigh these minor problems. The 20-page operator's manual is complete and understandable. Full technical specifications, troubleshooting guide, and "national frequency list" are included.

For additional information, contact *Regency Electronics, Inc., 7707 Records St., Indianapolis IN 46226-9986; (317)-545-4281.* Reader Service number 487.

John Moinar WA3ETD
Greenfield NH

WHAT DO *YOU* THINK?

Have you recently purchased a new product that has been reviewed in *73*? If you have, write and tell us what *you* think about it. *73* will publish your comments so you can share them with other hams, as part of our continuing effort to bring you the best in new product information and reviews. Send your thoughts to Review Editor, *73: Amateur Radio's Technical Journal*, Peterborough NH 03458.

RTTY LOOP

Marc I. Leavey, M.D. WA3AJR
6 Jenny Lane
Pikesville MD 21208

Okay, so that's one! You see, as I begin the eighth year of this column, I have to admit to making a mistake. I don't make many here, but this one is a doozy. Thanks and a tip of the cap to Ed Duellman K9FWR, Duane Vincent KA7JEX, and the countless others who will no doubt write between the time I write this month's column and when it sees print.

To explain, in the April column I discussed hooking a Murray-encoded teleprinter to an ASCII port of a computer, in that case, a Texas Instruments TI-99/4A. The problem was that I was referring to a Teletype Model KSR-35 as a Murray machine. It is not. The Model 35 is a 110-baud ASCII machine. The problem arose in my scribbled note to myself, wherein I changed the "35" to a "32". The Model 32 is the Murray version of the commonly found Model 33, which is also an ASCII machine.

So, if you all will take a pencil to your April issue and change the reference to a Model 35 to a Model 32, all will come out all right. No, this was not an intentional April Fool's joke, although it seems to look like one. And, fortunately, the general ASCII-to-Murray discussion of last month remains unaffected.

As I mentioned above, this is the start of the eighth year of RTTY Loop. Because we have picked up a good number of readers in the last few years, I think it is time to review some general points that may be confusing to the newcomers.

What is RTTY? "RTTY" stands for radioteletype, a mode wherein amateur-radio communication is maintained using signals decoded to activate various kinds of teleprinters or computers.

What kind of printers or computers? Some of the pioneering work in RTTY was done with teleprinters which look like the ones you see in newsroom photos of the 1950s. Various designations are given to them, most of them relating to Teletype Corporation model numbers. After a period of slow growth, where mostly mechanical teleprinters were in use, RTTY is now going through a boom with the arrival of microcomputers. Software, that is, programs, are available for about any home computer to turn it into a RTTY terminal.

What do you talk about? Well, what do you talk about on ham radio in general? Sure, topics include the equipment you are running, the weather, and the usual run-of-the-mill stuff. But, since today's RTTYers are likely to be in the forefront of digital technology, computers and the like are also active topics. Not only that, but RTTY stations also can send long texts such as messages, programs, and the like, and, especially around holidays, some of the famous RTTY pictures.

Where can I find a RTTY station? Still popular after all these years, look for the doodle-do of RTTY signals around 3520 kHz or 14080 kHz. There are other spots, and you may even find a local two-meter repeater with a RTTY net.

How much will it cost to get on RTTY? How much does a car cost? You can probably locate an old teleprinter around for a few dollars. Simple AFSK generators and demodulators have been published here and will be published in the future as new designs appear. Or, if you have a microcomputer such as a CoCo or any of the 6502 machines, a sawbuck or two should bring you enough programming to put that machine on the air. It's clearly not out of reach for most hams.

Where can I find out more? You knew there had to be a point to all of this, right? Well, you are holding, in your hand, a potent source of RTTY information. Keep reading *73*, keep reading RTTY Loop, and you should be able to get all the information you need.

I was not kidding about the bargain machines, folks. As I write this column, I am recovering from a day at the Greater Baltimore Hamfest and Computerfest. Next month I hope to print a few photos of the sights. Deadline precludes getting the film processed this month, but let me tell you—Model 15 and Model 33 teleprinters were being sold for less than fifty dollars, some for much less! The computer displays, tables and tables of them, often showed RTTY programs available. The tide is turning, ladies and gentlemen, and RTTY is growing faster then ever!

I have a letter here from Eric W. Davenport N4DTE who is using a 6809-based microcomputer under the FLEX operating system and is looking for a RTTY program to use on that computer. Well, Eric, I have looked around and, sorry to say, can find nothing that would support the system you are using. That is not to say it does not exist, though, and if any readers are using such a system on RTTY, I would be happy to hear about it and will pass the information along to Eric. One source you might try is *'68' Micro Journal*, a monthly magazine devoted to the 68xx series of computers. They lean toward FLEX and 6809s, so it sounds like your league. You can subscribe for one year by sending $24.50 to *'68' Micro Journal*, 5900 Cassandra Smith, PO Box 849, Hixson TN 37343. Be sure to drop my name, ok?

One more ham who has found happiness with a TI-99/4A is Paul Schmidt W9HD. Paul passes along his comments, with the note that his computer is on the air with the aid of the Kantronics Hamsoft program and the AEA CP-1 "Computer Patch." He enjoys operating RTTY, but I have to pass along his last few lines. You see, Paul works as a radio operator on a supertanker, and he writes, "By the way, I'm not too enthusiastic about AMTOR. On the ocean, we have SITOR and MARISAT. On this ship, we have neither one. I send my traffic a letter at a time on CW. How about that?" Thanks, Paul, and I do appreciate the comments.

Here is another letter from a ham trying to put yet another kind of computer onto RTTY. John A. Paiese, Jr. WB9JPH/5

writes several questions. The first seeks the existence of a program to place an Osborne 1 on the air on Morse, Murray, and ASCII. Well, the last one is easy, John. Any terminal program, such as the public domain MODEM7, will do fine to produce ASCII. I have not seen anything on the boards for RTTY or CW, but I'll keep my screen clean and looking.

John's next question shall be paraphrased for obvious reasons. "What do you think of the Milchig computer with a Fleischig interface for use on RTTY?" Unless I have seen the combination in question, there is no way I can answer the question! As a rule, any reputable product appears to be functional. I have received very few "lemon" reports, and those I try to pass along as best I can here in the column, usually quoting the reviewing amateur directly. I would encourage you to look around to see if you can play with someone else's system in your area before you buy. I don't know that I would base the purchase of a particular microcomputer on the desire to run RTTY, however. It is rapidly appearing that any one of the "consumer" line has supporting software.

So you see, my overall advice if you want to run a computer on RTTY is to first pick the computer. Pick it for what it can do within, and without, amateur radio. After all, a computer is too powerful a tool to limit to one use only. For that you could get a dedicated terminal. Then look for software and interfaces that appeal to you. Believe me, whatever I have seen I write about. If I have not written up a particular program or interface, it is not necessarily because it is bad; I probably have not had any hands-on exposure to it. And as stated here before, I won't write up an item based on a press release unless there are extenuating circumstances. I have done that in the past and we all got bitten—no more!

Hope that helps you out, John, and thanks for the note.

Because of the two-month delay between the time I write this column and publication, I am dragging my feet this month on the information sheet mentioned last month. I want to see what the response is and attempt to react accordingly. So I am still offering the first of several planned information sheets on RTTY. Simply send a self-addressed, stamped envelope or sufficient US funds for postage to foreign stations with $2.00 to the above address for the first sheet, an elementary introduction to RTTY. If the demand keeps up, sheets will be introduced to cover many of the elementary topics discussed in past columns.

Next month will include a look at the recent hamfest, if the pictures come out, and more of this and that. Let me hear from you, then look for your name here, in RTTY Loop.

FUN!

John Edwards KI2U
PO Box 73
Middle Village NY 11379

BASIC COMPUTING

If you're a forward-thinking ham (as opposed to those lids who devote their lives to repeaters and rag-chew nets), you probably own a microcompter. But do you ever actually program your machine? Probably. But odds are that you get more use out of canned software than your own creations.

As my dear friend Doctor Digital always says, programming is fun. That may be true. But which language is best?

Basic is by far the most popular micro language. Basic in ROM is a standard feature on most personal computers. Still, its awkward syntax and arcane structure make it a clumsy language to use in all but the most simple (dare I say basic?) applications. Pascal is much nicer, but has been slow to catch on. Everyone likes Pascal, but few actually seem to write software with it. Assembler is better yet, but is much too complicated for newcomers to handle.

So we're stuck with Basic. All in all, it's not an impossible language to work with, given its inherent limitations. More than one Field Day logging program has been written in this language and I suppose hams will continue to use Basic for years to come.

This month, for better or worse, FUN! looks at the world of Basic. GOTO Element 1.

ELEMENT 1
MULTIPLE CHOICE

1) The original form of Basic is known as:
   1) Dartmouth Basic
   2) Princeton Basic
   3) Original Basic
   4) Basic Basic
2) Which of the following Extended Color Basic commands tells a Radio Shack TRS-80 Color Computer to send sound through a TV speaker?
   1) SOUND ON
   2) SPEAKER ON
   3) AUDIO ON
   4) TV ON
3) Who invented Basic?
   1) Stan Wright and Herb Anderson
   2) Frank Sullivan and Steven Klein
   3) Thomas McIntire and Steve Jobs
   4) John Kemeny and Thomas Kurtz
4) What function does the system command CALL −151 serve on an Apple II?
   1) Puts the computer into the monitor mode
   2) Initializes slot 1
   3) Activates the computer's 80-column card
   4) POKES the decimal value 151 into memory location 16789
5) What function does IPL serve on Radio Shack's Model 100?
   1) Automatically executes a specified program as soon as the computer is switched on
   2) Sets the computer's real-time clock/calendar
   3) Initializes the 300 baud modem
   4) It serves no purpose
6) The Commodore 64 comes with how many bytes of random-access memory?
   1) 16K bytes
   2) 32K bytes
   3) 48K bytes
   4) 64K bytes
7) CP/M is:
   1) A language
   2) An operating system
   3) A local area network
   4) A popular word-processing program
8) PRINT USING:
   1) Is not a Basic statement
   2) Tells the computer to print strings using a non-ASCII format
   3) Prints numbers or strings in a variable format
   4) Is a standard part of Applesoft Basic
9) LLIST, in Microsoft Basic:
   1) Prints listings lengthwise
   2) Cannot be used as a program statement
   3) Sends a listing in memory to a printer
   4) Prints listings twice
10) On a TRS-80 Model III, PRINT@:
   1) Would print the character "@"
   2) Tells the computer to print a character at a specific point on the video display
   3) Is never used
   4) Tells the computer to output to a printer

ELEMENT 2
TRUE-FALSE

Separate the working from the nonfunctional Basic program lines.

	True	False
1) 10 ? "HELLO"	_____	_____
2) 10 C = A PLUS B	_____	_____
3) 10 LET A = B	_____	_____
4) 10 FOR I = 1− 5	_____	_____
5) 10 A + B = C	_____	_____
6) 10 C = A × B	_____	_____
7) 10 IF B = C	_____	_____
8) 10 GOTO	_____	_____
9) 10 INPUT 10	_____	_____
10) 10 PEEK 16789	_____	_____

ELEMENT 3
SCRAMBLED WORDS

Unscramble the following Basic commands and statements:

UNR	TISL	RITPLN
PUINT	BUGOS	EWN
LAREC	HENT	POST
DNE	FENTID	MID

ELEMENT 4
FILL IN THE BLANK

1) Many Basic programs use a _____/NEXT loop.
2) Every RETURN must have a _____.
3) Programmer comments are contained in a _____ statement.
4) IF A = 20 _____ 50
5) To get a result from READ, one must supply at least one _____ statement.

THE ANSWERS

Element 1:
1—1, 2—3, 3—4, 4—1, 5—1, 6—4, 7—2, 8—3, 9—3, 10—2.

Element 2:

1—True	The question mark will work as a PRINT statement or command on most personal computers.
2—True	But never A + B = C.
3—True	LET is optional, but you can toss it in if you want to waste memory.
4—False	TO, not "−", is what works.
5—False	See question 2.
6—False	Multiply with "*" not "×."
7—False	Not a complete statement. Toss in a THEN.
8—False	No line number specified.
9—False	Needs a variable.
10—False	Memory address must be in parentheses.

Element 3:
RUN, LIST, LPRINT; INPUT, GOSUB, NEW; CLEAR, THEN, STOP; END, DEFINT, DIM.

Element 4:
1—FOR
2—GOSUB
3—REM
4—THEN
5—DATA

SCORING

Element 1:
Two and one-half points for each correct answer.

Element 2:
Two and one-half points for each correct answer.

Element 3:
Two points for each word unscrambled.

Element 4:
Five points for each word correctly filled in.

Have you conquered the basics of Basic?

1-20 points— Think computers are just a fad
21-40 points— Think computer prices are still too high
41-60 points— Happy to run canned software
61-80 points— A true-blue hacker
81-100 points— Program in machine code for kicks

HAM HELP

I need a schematic and service manual for the Lafayette BCR-101 shortwave receiver.

Marvin Hess W2WKU
204 Queensway Road
Elma NY 14059

Wanted: Program for the Commodore VIC-20 and/or C-64 computer to allow them to be used as an electronic mailbox (RBBS or MSO) on the air on ASCII and/or Baudot; may be commercial program or home brew.

SSG. Gary E. Kohtala DA2XF
USAFS-A, Box 1415
APO NY 09458

Wanted: An instruction manual for a Leeds and Northrup galvanometer bridge, catalog #4270, serial #1041207. Will gladly pay copying and mailing costs.

Vernon Jones WB1BVH
32 Cat Mousam Road
Kennebunk ME 04043

Can you help me find a book for troubleshooting radio problems? Especially receivers. I'd like to understand the theory and what to check for with particular symptoms.

Ray Poli
2322 Calumet
Flint MI 48503

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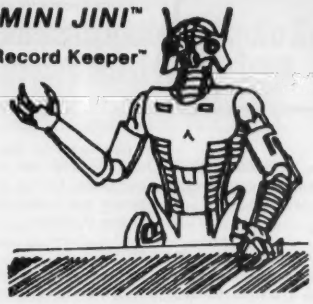

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MRF426*	25W	17.00	40.00
MRF426A*	25W	17.00	40.00
MRF433	13W	14.50	32.00
MRF435*	150W	42.00	90.00
MRF449	30W	12.00	27.00
MRF449A	30W	11.00	25.00
MRF450	50W	12.00	27.00
MRF450A	50W	12.00	27.00
MRF453	60W	15.00	33.00
MRF453A	60W	15.00	33.00
MRF454	80W	16.00	35.00
MRF454A	80W	16.00	35.00
MRF455	60W	12.00	27.00
MRF455A	60W	12.00	27.00
MRF458	80W	18.00	40.00
MRF460	60W	16.50	36.00
MRF475	12W	3.00	9.00
MRF476	3W	2.50	8.00
MRF477	40W	13.00	29.00
MRF479	15W	10.00	23.00
MRF485*	15W	6.00	15.00
MRF492	90W	18.00	39.00
SRF2072	75W	15.00	33.00
CD2545	50W	24.00	55.00

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MRF237	1W	2.50	—
MRF238	30W	12.00	—
MRF239	30W	15.00	—
MRF240	40W	16.00	—
MRF245	80W	25.00	59.00
MRF247	80W	25.00	59.00
MRF260	5W	6.00	—
MRF264	30W	13.00	—
MRF492	70W	18.00	39.00
MRF607	1.8W	2.60	—
MRF627	0.5W	9.00	—
MRF641	15W	18.00	—
MRF644	25W	23.00	—
MRF646	40W	24.00	59.00
MRF648	60W	29.50	69.00
SD1416	80W	29.50	—
SD1477	125W	37.00	—
2N4427	1W	1.25	—
2N5945	4W	10.00	—
2N5946	10W	12.00	—
2N6080	4W	6.00	—
2N6081	15W	7.00	—
2N6082	25W	9.00	—
2N6083	30W	9.50	—
2N6084	40W	12.00	29.00

TMOS FET

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CONTESTS

Robert Baker WB2GFE
15 Windsor Dr.
Atco NJ 08004

ARRL VHF QSO PARTY
Starts: 1800 GMT June 9
Ends: 0300 GMT June 11

Sponsored by the ARRL, the object is to work as many amateur stations in as many different ARRL sections and countries as possible using authorized amateur frequencies above 50 MHz.

Operating categories include single-operator using multi- or single band, or multi-operator. Single-operator stations must use one person for all operating and logging functions. Single-operator stations may submit single-band scores for 50, 144, 220, 432, and 1296-and-up categories. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported.

Multi-operator stations must locate all equipment (including antennas) within a 300-meter circle.

Stations may be worked once per band, regardless of mode. Each QSO must be acknowledged; one-way exchanges do not count. Foreign stations may work only stations in the USA, Canada, and US possessions for contest credit.

Retransmitting either or both stations or use of repeater frequencies is not permitted. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters to solicit contacts. Use of the national calling frequency (146.52) or immediate adjacent guard frequencies is also prohibited. Only recognized simplex frequencies may be used, such as 144.90 to 145.10; 146.49, .55, and .58; and 147.42, .45, .48, .51, .54, and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of the contest rules or the spirit and intent of the band plans as recommended in the *ARRL Repeater Directory* may be used for contest purposes.

All operation must be fixed, portable, or mobile under one call from one ARRL section. A transmitter used to contact one or more stations cannot be used under any other call during the contest period with the exception of family stations where more than one call is assigned to one location by FCC/DOC. Also, one operator may not give out contest QSOs using more than one callsign from any one location.

Only one signal per band at any given time is permitted, regardless of mode. While no minimum distance is specified for contacts, equipment should be capable of real communications (i.e., able to communicate over at least a mile). Multi-operator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station must exist for each QSO made under these conditions.

Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs of Technician class or higher using coherent radiation on transmission (e.g., laser) and employing at least one stage of electronic detection on receive.

EXCHANGE:

Name of section, VE province, or DX country. Must be acknowledged by both operators for credit by either.

SCORING:

Count one point for each complete 50- or 144-MHz QSO, 2 points for each 220- or 420-MHz QSO, and 3 points for each 1215-MHz and above QSO. Crossband QSOs do not count.

Multipliers count once per band: each ARRL section in the contiguous 48 states (63 max.), each Canadian province (max. 12), and each DXCC country (excluding W and VE).

REPORTING:

Entries must be postmarked no later than July 11th and sent to the ARRL Headquarters in Newington CT 06111. Official entry forms are available from the same address for an SASE. Usual ARRL disqualification rules apply. Usual awards to top scorers in each ARRL section, some limited to where significant effort or competition is evidenced. Multi-operator entries are not eligible for single-band awards.

SUMMER SMIRK PARTY
Starts: 0000 GMT June 16
Ends: 2400 GMT June 17

The contest is sponsored by the Six-Meter International Radio Klub (SMIRK). No crossband contacts, multi-operators, or partial contacts are allowed. Check logs or dupe sheets are not needed.

EXCHANGE:

SMIRK number and ARRL section, foreign state, province, prefecture, or country. Count ARRL sections in the 48 US states only; KH6 and KL7 count as countries. Washington DC counts as a section as well. Canadians count as provinces; all others count as states, provinces, prefectures, or countries.

SCORING:

Count 2 points for each SMIRK contact, 1 point for non-SMIRK QSOs. Add QSO points and multiply by number of ARRL sections, foreign states, provinces, prefectures, or countries worked for final score.

AWARDS:

Certificates for high-scoring SMIRK in two divisions: US/Canada and foreign. Certificates for high score in each ARRL section and foreign state, province, prefecture, or country.

ENTRIES:

Entries must be submitted on the fall, 1981, edition of the official SMIRK log. Single copies are available for an SASE and photocopies may be used. Send log requests and entries postmarked by July 8th to: Mark S. Anderson WB5NPK, 8932 Saddle Trail, San Antonio TX 78255.

ARRL FIELD DAY
Starts: 1800 GMT June 23
Ends: 2100 GMT June 24

Sponsored by the ARRL, the contest is open to all amateurs in the ARRL Field Organization plus Yukon and NWT. Foreign stations may be contacted for credit but are not eligible to compete. The object is to work as many stations as possible under less-than-ideal conditions. Operating times are limited depending on your operating class; check rules below.

Entry categories are classified by the maximum number of simultaneous transmitted signals followed by the designation of the nature of the individual or group participation. Below 30 MHz, a transmitter must remain on a particular band for at least 15 minutes once used for a contact on that band. During this 15-minute period, the transmitter is considered to be transmitting a signal (even if it is not) for purposes of determining transmitter class. Switching devices are prohibited.

Class A consists of club and non-club portable stations specifically set up for Field Day. Such stations must be located in places that are not regular station locations and must use no facilities installed for permanent station use nor any structures installed permanently for FD use. Stations must be operated under one callsign and under the control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a 300-meter circle. All contacts must be made with transmitters and receivers operating independent of commercial mains. Entrants who, for any reason, operate a transmitter or receiver from commercial mains for any contacts will be listed separately at the end of their class.

Any Class-A group whose entry classification is two or more transmitters (non-Novice) may also use one Novice/Technician operating position (Novice bands only) without changing its basic entry classification. This station (including antennas) should be set up and operated by Novice and Technician licensees and should use the callsign of one of these operators.

Class B consists of non-club portable stations set up and operated by not more than two licensed amateurs. Other provisions are the same as for Class A.

Class C consists of mobile stations in vehicles capable of operation while in motion and normally operated in this manner, including antenna. This includes maritime and aeronautical mobiles.

Class D consists of stations operating from permanent or licensed station locations using commercial power. This group of stations may only count contacts made with Class A, B, C, and E Field-Day groups for points.

Class-E stations are the same as Class D except they use emergency power for transmitters and receivers. They can work stations in all classes.

Operators participating in FD may not contact for point credit the FD portable station of a group with which they participate. Any station used to contact one or more FD stations may not be used under any other call during the FD period, except for family stations.

Each phone and each CW segment is considered as a separate band. All voice contacts are equivalent, and RTTY/ASCII is counted as CW. A station may be worked once on each band—crossband contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited, except that a Novice/Technician position may operate on any Novice band segment at any time. No repeater contacts.

EXCHANGE:

Stations in any ARRL section send Field-Day operating class and ARRL section. A four-transmitter station in NJ would send "4A NJ". Foreign stations send RS(T) and QTH.

SCORING:

Scores are based on the number of valid contact points times the multiplier corresponding to the highest power used at any time during the FD period, plus bonus points. Phone contacts are one point each, CW counts two points each. Power multipliers are: 5 for using a dc input power of 10 W (20 W PEP) or less (or 5-W dc output/10-W PEP output) and if using a power source other than commercial mains or motor-driven generator; 2 for using a dc input power of 200 W or less on CW and 400 W PEP or less on SSB; 1 for using anything higher.

Batteries may be charged while in use for Class-C entries only. For other classes, batteries charged during the FD period must be charged from a power source independent of the commercial mains.

Bonus points will be added to the score (after the multiplier is applied) to determine the final score. Only Class-A and Class-B stations are eligible for bonuses:

CALENDAR

Jun 9–11	**ARRL VHF QSO Party**
Jun 16–17	**Summer SMIRK Party**
Jun 23–24	**ARRL Field Day**
Jul 1	**Canada Day Contest**
Jul 7–8	**YV Independence Worldwide Contest—SSB**
Jul 13–15	**A5 International SSTV-DX Contest**
Jul 14–15	**IARU Radiosport Championship**
Jul 28–29	**YV Independence Worldwide Contest—CW**
Aug 4–5	**ARRL UHF Contest**
Aug 11–12	**New Jersey QSO Party**
Aug 18–19	**SARTG Worldwide RTTY Contest**
Aug 24–27	**A5 North American UHF FSTV-DX Contest**
Sep 8–9	**ARRL VHF QSO Party**
Sep 15–17	**Washington State QSO Party**
Sep 22–23	**Late Summer QRP CW Activity Weekend**
Oct 6–7	**ARRL QSO Party—CW**
Oct 13–14	**ARRL QSO Party—Phone**
Oct 20–21	**Jamboree On the Air**
Nov 3–4	**ARRL Sweepstakes—CW**
Nov 17–18	**ARRL Sweepstakes—Phone**
Dec 1–2	**ARRL 160-Meter Contest**
Dec 8–9	**ARRL 10-Meter Contest**
Dec 26–Jan 1	**QRP Winter Sports—CW**
Dec 30	**Canada Contest**

1) *100% Emergency Power*—100 points per transmitter for 100% emergency power. All equipment and facilities at the FD site must be operated from a source independent of the commercial mains.

2) *Public Relations*—100 points for public relations. Publicity must be obtained or a bona fide attempt to obtain publicity must be made, or operation must be conducted from a public place (such as a shopping center). Evidence must be submitted in the form of a clipping, a memo from a BC/TV station that publicity was given, or a copy of material that was sent to news media for publicity purposes.

3) *Message Origination*—100 points for origination of a message by the club president or other FD leader, addressed to the SM or SEC, stating the club name (or non-club group), number of operators, field location, and number or ARES members participating. The message must be transmitted during the FD period and a fully-serviced copy of it must be included with the FD report. The message must be in standard ARRL message form or no credit will be given.

4) *Message Reply*—10 points for each message received and relayed during the FD period, up to a maximum of 100 points. Copies of each message, properly serviced, must be included with the FD report.

5) *Satellite QSO*—100 points can be earned by completing at least one QSO via satellite during the FD period. The repeater provision is waived for satellite QSOs and a satellite station does not count as an additional transmitter. Show satellite QSOs as a separate band on the summary sheet.

6) *Natural Power*—FD groups making a minimum of 5 QSOs without using power from commercial mains or petroleum derivatives can earn 100 points. This alternative power source also includes batteries charged by natural means (not dry cells). The natural-power station counts as an additional transmitter. If you do not want to change your entry class, take one of your other transmitters off the air while making the natural-power QSOs. A separate list of natural-power QSOs should be enclosed with your entry.

7) *W1AW Message*—A bonus of 100 points will be earned by copying a special ARRL FD bulletin sent over W1AW on its regularly announced frequencies just before and during FD. This message can be received directly from W1AW or by any relay method. An accurate copy of the received message should be included in your FD report.

REPORTING:

Entries must be postmarked by July 24th; no late entries can be accepted. A complete entry consists of a summary sheet and a list of stations worked on each band/mode during FD, plus bonus proof. The list of stations worked on each band or mode may take the form of official ARRL dupe sheets or an alphanumeric listing of callsigns worked per band and mode. This list may be computer-generated. Incomplete or illegible entries will be classified as check logs. A copy of FD logs should be kept by your FD group but should not be sent in unless specifically requested by the ARRL. Normal ARRL disqualifications rules apply.

All entries and requests for official forms should be addressed to: ARRL, Newington CT 06111. Include a 9" by 12" self-addressed envelope with 3-oz. postage for a complete Field-Day entry package.

CANADA DAY CONTEST
Starts: 0000 GMT July 1
Ends: 2400 GMT July 1

Sponsored by the Canadian Amateur Radio Federation (CARF), the contest is open to all amateurs and everybody works everybody. Entry classes include single-operator, all bands; single-operator, single band; and multi-operator, all bands. There are also separate single-operator QRP (5-W output) classes for all bands and single band.

Use all bands from 160 to 2 meters on CW and phone combined. All contacts with amateur stations are valid. Stations may be worked twice on each band, once on CW and once on phone. No crossmode contacts and no CW contacts in the phone bands are allowed.

EXCHANGE:

Signal report and consecutive serial number starting with 001. VE1 stations should also send their province (NS, NB, PEI). Do not use a separate series of numbers on each band.

SCORING:

Score 10 points for each contact with Canada, 1 point for contacts with others. VE0 counts as Canada. Score 10 points for each contact with any CARF official station using the suffix TCA or VCA. Multipliers are the number of Canadian provinces/territories worked on each band on each mode (12 provinces/territories × 2 modes for a maximum of 192 possible multipliers). Contacts with stations outside Canada count for points but not multipliers.

FREQUENCIES:

1810, 1840, 3525, 3770, 7025, 7070, 14025, 14150, 21025, 21250, 28025, 28500, 50.040, 50.110, 144.090, 146.52. Suggest phone on the even hours (GMT), CW on the odd hours (GMT). Since this is a Canadian-sponsored contest, remember to stay within the legal frequencies for your country!

AWARDS:

Certificates will be awarded to the highest score in each category in each province/territory, US call area, and DX country. If scores are close, second- and third-place certificates will be awarded. Additionally, several trophies will be awarded to some top scorers courtesy of sponsors.

ENTRIES:

A valid entry must contain log sheets, dupe sheets, a cover sheet showing claimed QSOs, QSO points, a list of multipliers, and a calculation of final claimed score. Cover sheets and multiplier checklists are available. Entries should be mailed within one month of the contest, with your comments, to: CARF, PO Box 2172, Stn D, Ottawa, Ontario, K1P 5W4 Canada.

Results will be published in *TCA*, the Canadian amateur magazine. Non-subscribers may include an SASE for a copy of the results.

North Florida Amateur Radio Society
Balanced Modulator
JACKSONVILLE, FLORIDA
W4UZ
ARRL

NEWSLETTER OF THE MONTH

The North Florida Amateur Radio Society's *Balanced Modulator* is consistently one of the best club publications in the nation. In addition to lively editorial commentary and very comprehensive ham news coverage, *BM* also includes Pete Nissen W4PTT's well-done "DX and Other Stuff" column. Two other features—unique and valuable—began with the March issue: a NOFARS member business and services directory and NOFARS assistance and advice network listings. Congratulations, President Billy Williams N4UF and all NOFARS members!

To enter your club's newsletter in *73*'s Newsletter of the Month Contest, send it to *73*, Pine Street, Peterborough NH 03458, Attn: Newsletter of the Month.

DX

Chod Harris VP2ML
Box 4881
Santa Rosa CA 95402

THE NCDXF 20-METER BEACON NETWORK

Have you been listening on 14100 as I suggested last month? If not, tune your receiver to that frequency as you read the column this time.

What do you hear under all that interference? A strange pattern of CW signals and long dashes from stations all over the world. This is the 20-meter beacon network, constructed by the Northern California DX Foundation (NCDXF).

This network consists of eight automated beacons scattered around the globe. Each beacon transmits on a strict time sequence (see Table 1).

The beacons provide current information on the state of the ionosphere and on radio propagation to various parts of the world, all in less than ten minutes! Let's have a closer look at this network to see how we can use it to best advantage.

The Beacons

Each of the beacons consists of a power supply and controller, a Kenwood TS-130 transmitter, and an omnidirectional antenna. The controller features a quartz-clock accuracy of one part in 10,000,000, a microprocessor to generate the beacon CW identification, and a switching network to reduce the power of the transmitter in 10-dB steps.

This power reduction is one of the most fascinating aspects of the beacon system. During the 58 seconds that each beacon transmits, its output power drops by a factor of 10 every ten seconds (see Table 2). The final 9-second-long dash, preceded by four dits, is sent at the power level of only 0.1 Watts! And yet you can hear the 0.1-Watt level from several of the beacons.

A Kenwood TS-130 transceiver and a quad antenna comprise the rest of the beacon. The Kenwood transceivers have held up very well under the continuous-duty operation of the beacons; no beacon has ever been off the air for transceiver problems. The antenna is a turnstile made of two quad loops at right angles to each other. This antenna produces an antenna pattern practically omnidirectional in the horizontal plane, and with the pattern favoring low-angle radiation in the vertical plane. Each side of the quad loops is 17' 11" long.

Each beacon package, including antenna, costs about $1300. The Northern California DX Foundation is picking up the tab for this entire project, including the eight beacons in place, and future beacons (see below).

0000 4U1UN	United Nations, New York City
0001 W6WX/B	Stanford University, Palo Alto, California
0002 KH6O/B	Northeastern Oahu Island, Hawaii
0003 JA2IGY/B	Mt. Asama, Japan
0004 4X6TU/B	Tel Aviv University, Israel
0005 OH2B	Helsinki Technical University, Finland
0006 CT3B	Madeira Island, Africa
0007 ZS6DN/B	Transvaal, South Africa
0008-9	(silent)

Table 1.

Behind the Beacons

The network is the brainchild of Stanford Research Institute scientist Dr. Mike Villard W6QYT, who has had a long time interest in worldwide radio propagation. With the support of the Northern California DX Foundation and the active assistance of several San Francisco Bay area amateurs, the network began to take shape in the late 70s.

Dave Lesson W6QHS took some time off from his multimillion-dollar Silicon Valley company to design the necessary hardware. His contribution included the overall design of the network along with the details of the switching system to change the power level of the transmitter. Jack Curtis K6KU designed the clock and microprocessor which control the switching circuitry and generate the code identification. Jack has had considerable experience in this field; he's the Curtis of the Curtis keyer and code-teacher line! And finally Cam Pierce K6RU assembled much

of the actual hardware and prepared the actual beacon packages. NCDXF President Jack Troster W6ISQ provided (and is continuing to provide) overall coordination and international supervision of the network.

And continuing on duty on a daily basis is Al Lotze W6RQ, who coordinates the regular observers of the beacons and compiles the reports (see below).

Among the other persons vital to the success of the beacon network are the individual beacon "custodians." These are the hams and groups, carefully selected by the NCDXF, to set up and operate the beacons. In many cases the beacons are under the auspices of a university.

The beacons network grew slowly; the first beacon, WB6ZNL, went on the air at the end of 1979. WB6ZNL has changed callsigns a couple of times since then and is now W6WX/B at Stanford University in Palo Alto, California.

That first beacon required more than hardware. The beacon transmits what is technically an unattended A0 emission, which is not permitted under Federal Communications Commission (FCC) amateur rules. So the Foundation had to request a special waiver of the FCC rules to allow the beacon to begin transmitting. The same held true for the Hawaiian beacon, KH6O/B, under the watchful eye of Bob Jones KH6O. Perry Williams W1UED of the American Radio Relay League's Washington DC office was instrumental in obtaining the necessary waivers.

On the other hand, the other beacon located "within" the United States required no such special permission. The 4U1UN beacon sits on UN territory in New York City and thus falls under the rules of the International Telecommunication Union, which permits the beacon.

The situation was even more complicated in Japan. Japanese amateur regulations had neither rules nor standards about beacons. In order to get permission to establish the beacon in Japan, JA hams had to work with the licensing authority to *write entirely new regulations* for beacon standards.

Perseverance prevailed, however, and by early 1983, all eight beacons were on the air. The beacons' record of dependability has been very good. Some of the beacons associated with universities must occasionally shut down to avoid disturbing delicate experiments. But there has been little unscheduled "downtime" on the system. The only recurring problem was a single resistor in the power supply, since replaced. The network's on-time record is a great tribute to the design, engineering, and maintenance of the beacons.

The very dependability of the beacons has led to one slight problem: the clocks of the beacons slowly drift, and the beacons start to overlap. The clocks in the beacons are accurate to about one part in ten million, or about one half second a month. Since the beacons have required no maintenance other than resetting the clocks, their timers have occasionally drifted enough to overlap. So if you want to set your watch by a radio signal, tune to WWV (see this column, April, 1984).

Using the Beacons

These beacons, both individually and as a network, provide many benefits to the DXer. Besides the obvious use of determining band openings, hams can use this system to check antennas, compare rigs, calibrate their S-meters, and compute antenna patterns. Let's look at some of these possibilities.

Since the beacons put out the same power day after day, you can use the beacon network to monitor the condition of your station. By logging the signal strengths of the different beacons at various times of the day, you can build a reference point for changes in your station. For example, if your coaxial cable begins to deteriorate, you might notice a gradual reduction in the signal strengths of the beacons. Similarly, changes in switches, filters, and rigs can be compared to the references you establish by consistently monitoring these beacons.

Such consistent monitoring is important if you want to eliminate the vagaries of propagation from your considerations. You don't want to rip out a new antenna just because you tested it on the day of a solar flare!

You can also use the beacon network to check the low-angle radiation pattern of your antenna. Since most of the beacons are a goodly distance from your station, most of the radiation you hear from them will arrive at your antenna at the low angle characteristic of DX communications. By swinging your antenna during the long, 9-second dash of each beacon, you can note relative signal strengths from the front and the back of the antenna. You may find the ratio between these figures quite different from that advertised by the antenna manufacturer!

Of even greater interest to the DXer will be the angle of minimal reception on the antenna. Beam or directional antennas *do* increase the signal strength in a given direction, but they also serve an even more valuable service by reducing the signal strengths of stations lying in other directions. The ability to "null out" or nullify an interfering station is at least as important as the increased signal strength given by the directional antenna.

So the DXer wants to know where to point the beam to *minimize* reception of the offending signal. Knowing where the nulls are in your antenna pattern is as important as knowing the front-to-back ratio.

Another immediate benefit of the NCDXF beacon network is its use for S-meter calibration. The power level of each beacon decreases by a factor of 10, or by 10 dB, each 10 seconds. You can calibrate your S-meter by carefully watching the meter during these power changes. Your meter reading should drop by 10 dB (a little less than 2 S-units) each step in power reduction.

If your receiver doesn't track this way, you might want to produce a calibration chart to reflect the *actual* power levels.

And, of course, the beacons tell what is happening with radio propagation *right now*. How many beacons can you hear? How strong are their signals? How do these signal strengths compare to other days when the propagation was good, medium, or fair?

Beacon report coordinator Al Lotze W6RQ feels that the beacons present a more accurate picture of present amateur-radio propagation than do the WWV bulletins or the forecasts by charts or tables in the amateur-radio magazines. "Those charts don't include the A index" (see this column, last month). "Their Maximum Usable Frequency charts only reflect solar flux. But I have found the A index a more telling indicator of present propagation," Al explains.

How can the DXers best use this propagation information? First, beacon receptions might suggest good possibilities for directional CQs. If you *know* the band is open from your location to Eastern Africa (CT3) you might try a CQ directed toward that area. DX stations are much more likely to answer a directional or specific CQ than a more general "CQ DX."

With regular listening, you can learn a great deal about radio propagation from your station to other parts of the world. When does the long or skew path open up to Europe, or to Japan? In which direction does it peak? What are the differences in signal strength as dawn or sunset passes? When is the best time to get up in the middle of the night to work that rare DXpedition?

The avid student of radio propagation can use the beacon network to obtain even more information. What is the relationship between the WWV flux numbers and propagation from your location? Do the signal strengths of the polar and the equatorial paths change at the same time, or in different patterns? The possibilities are endless.

Al Lotze W6RQ coordinates the beacon reports from this modest station.

Power Level	Message
100 Watts	QST de (callsign)
100 Watts	. _____ (9-second dash)
10 Watts	.. _____ (9-second dash)
1 Watt	... _____ (9-second dash)
0.1 Watt	.... _____ (9-second dash)
100 Watts	SK (callsign)

The entire sequence takes about 58 seconds, at about 20 words per minute.

Table 2. Beacon transmission pattern.

Making Beacon Reports

If you are serious about listening to the beacons, you might want to share your observations and ideas with others of similar persuasion. Beacon report coordinator Al Lotze W6RQ (see photo) collects the reports from regular and irregular reporters from all over the world.

As of last winter, Al had received more than 250 reports from every continent. The reports have ranged from a simple, "I heard your beacon yesterday," to complex and detailed analyses and theories of propagation. The most dedicated are several European scientists. At least one Belgian amateur sends in a full page of comments and ideas every month! Other regular reporters include engineers and shortwave listeners (SWLs). The list of reporters shows that you don't need fancy equipment to monitor the beacon networks; Al has received a report from a Czechoslovakian amateur who used a direct-conversion receiver!

Amateurs and others interested in becoming regular monitors and reporters for the beacon network should contact Al Lotze W6RQ, 46 Cragmont Ave., San Francisco CA 94116-1308. Al prefers the official reporting form but will acknowledge all reports with a beacon network QSL. You don't have to hear all eight beacons to send in a report, but you should listen to the network several times at different hours and note any patterns.

The informal collection of regular beacon watchers spends more time listening than they do transmitting (like any good DXer!) but they do occasionally key up their rigs during the 2-minute "break" at the end of each sequence of bulletins. If you listen closely during this "off" time, you might hear a beacon observer send "All 8 hrd de W6RQ," or a similar message.

Al Lotze W6RQ Report Coordinator

Al Lotze is an excellent man for the job of coordinating these beacon reports. In his 53 years as an amateur, Al (see photo) has amassed 282 countries on CW. His station today is as elaborate as any he has used in more than 50 years, but you may note the absence of such items as an antenna switch, antenna rotor, or amplifier.

Al runs Kenwood barefoot through a Johnson matchbox to a G5RV antenna on the roof of his home, high on a hill above San Francisco. Al claims his DX success comes from his suffix. "There are more stations with the suffix RQ in the DXCC listing than any other suffix," Al notes with a twinkle in his eye. Despite this simple station setup, Al has frequently heard all eight beacons in one cycle, especially around local sunset when the A index is under 10.

A long-time follower of radio propagation, Al monitors WWV propagation bulletins daily. Weather permitting, Al also sets up his telescope every day to chart the size and position of each sunspot. His charts appear in *QRZ DX* every week.

Al maintains lively communications with his far-flung collection of regular beacon reporters. With a working command of French, Spanish, and German, Al attempts to respond to most reporters in their native languages. With daily charts of the sun's surface for years, careful graphing of the WWV propagation information, and more than 50 years of amateur experience, Al holds his own among

the professional propagation experts with whom he corresponds.

Results of Beacon Network

The information from the beacon watchers continues to pour into Al's mailbox, so it will be years before any statistically valid results come from this network. But Al has noted several trends which became evident very quickly. The first, and perhaps most interesting pattern, is how the low-power signals can be heard clearly. QRP enthusiasts have been saying this for years: you don't need power to make DX contacts. Listen for yourself to hear how often you can hear the 0.1-Watt level of the beacons. Makes one want to ban all amplifiers.

Another interesting conclusion suggested by the beacon network is that the traditional explanation of how radio waves travel more than 2500 miles is wrong. The textbooks claim that signals which travel farther than 2500 miles must bounce back and forth between the Earth's surface and the ionosphere several times: multi-hop propagation. However, much of the signal is lost in each bounce. The mathematics of this theory suggest that the 0.1-Watt beacon would never be heard if the signal were to propagate via multi-hop propagation. So the radio signal must get from there to here in some other way. We may never know exactly how the signal travels, but we do know that the traditional multi-hop theory has holes in it.

Al has also noticed that the A index seems to be closely related to beacon receptions. The only times he has heard all eight beacons at the same time has been when the A index is very low, 10 or less. He notes that traditional propagation forecasting, including the charts and tables in the amateur press, do not include the A index in their calculations. Thus even when the solar flux might be high enough for good radio, the high A index may prevent good propagation.

The Future of the Network

What's ahead for the NCDXF 20-meter-beacon network? The two "off" minutes certainly suggest that at least two more beacons will be forthcoming soon. In the works for this summer is a beacon on the northern coast of South America, in Colombia. Another possibility for a tenth beacon is the southern end of the South American continent, but the real propagation hounds prefer a Western Australia location, VK6.

The beacon network doesn't have to stop growing at ten. Built into the control circuitry is the ability to switch to 20 beacons per ten-minute cycle. One can imagine a few years from now being able to get exact propagation information to 20 different locations around the world in only 10 minutes!

These beacons and many other DX activities, including major DXpeditions, are sponsored by the Northern California DX Foundation. Membership in the NCDXF is $10.00 and includes a handsome membership certificate. Contact NCDXF at PO Box 2368, Stanford CA 94305.

And please, for the sake of all of those hams listening to the beacons, stay off 14100 kHz!

AWARDS

Bill Gosney KE7C
Micro-80, Inc.
2665 North Busby Road
Oak Harbor WA 98277

ELMER OF THE YEAR

F. Wendell Tletsworth W2SUE was chosen as QCWA's Northern New Jersey Chapter's 1983 Elmer of the Year from a field of nominees by a committee which included such prominent local amateurs as Joseph Painter W2BHM, head of the W2 QSL Bureau, and William Mumford W2CU.

W2SUE has been teaching ham-radio courses since 1965. He currently teaches Novice classes at the Nutley NJ Red Cross Building and is active in Army Mars as AAR2JP.

SOUTH EAST QUEENSLAND TELETYPE GROUP AWARD

This award is open to all transmitting and listening amateurs who gain award points in the following manner: Australian amateurs must score 5 points and overseas amateurs must score 3 points.

(a) To qualify, a station must, where possible, copy the official station of the South East Queensland Teletype Group, VK4TTY, during a news broadcast and, in the case of a transmitting amateur, participate in the callback (2 award points). A portion of the printout of the news broadcast together with the date, time, frequency, and broadcast number are to accompany the request for the award.

(b) Additionally, a transmitting amateur must work three member stations of the SEQTG on RTTY (1 point each). Log extracts and/or printouts are to be included with the award application, and each member station may be counted only once towards the award.

(c) Listening amateurs should, in lieu of (b), forward log extracts and/or printouts of three contacts involving different member stations of the SEQTG (1 point each).

Applicants for the award should forward the above information together with one dollar Australian or 5 IRCs, to cover postage and printing costs, to the Secretary, SEQTG, PO Box 274, Sunnybank, Queensland 4109, Australia.

WORKED ALL BERMUDA

The WAB Award is issued to amateurs throughout the world by the Radio Society of Bermuda. To qualify, applicants must submit proof of having worked a minimum of nine (9) parishes in Bermuda: Sandys, Southampton, Warwick, Paget, Pembroke, Devonshire, Smith's, Hamilton, and St. George's.

The award is an antique map of Bermuda (20" × 23") suitably inscribed with the recipient's name and callsign and signed by His Excellency the Governor of Bermuda.

The award is not available to stations who worked Bermuda via mobile including maritime or aeronautical. No band or mode endorsements are available. Only one mobile or portable from within Bermuda may be used in making claimed contacts on your applications.

QSL cards are required as proof of contact and they must be sent to the awards manager with sufficient postage for their safe return. The Bermuda Award is issued free of charge! Submit your applications to: Award Manager, PO Box 275, Hamilton 5, Bermuda.

WORKED BROWARD COUNTY CITIES

The Broward Amateur Radio Club, Inc., sponsors the new WBCC award, available to licensed amateurs who submit proof of two-way contact as follows:

(a) Residents of Broward, Colliers, Dade, Glades, Hendry, Lee, Martin, Monroe, or Palm Beach counties must work all 29 of the cities listed below.

(b) All other amateurs must work 15 of the 29 cities within Broward county.

To be valid, all contacts must be verified by at least two fellow amateurs and application must show all logbook information as well as the QTH of the station worked.

To apply, mail your application with $1.00 (US funds) and two first-class stamps (DX stations send 10 IRCs) to: BARC Award Manager, WD4RAF, 1921 NW 41st Street, Oakland Park FL 33309.

Qualifying city contacts include: Coconut Creek, Cooper City, Coral Springs, Dania, Davie, Deerfield Beach, Fort Lauderdale, Hacienda Village, Hallandale, Hillsboro Beach, Hollywood, Lauderdale-by-the-Sea, Lauderdale Lakes, Lauderhill, Lazy Lake, Lighthouse Point, Margate, Miramar, North Lauderdale, Oakland Park, Parkland, Pembroke Park, Pembroke Pines, Plantation, Pompano Beach, Sea Ranch Lakes, Sunrise, Tamarac, and Wilton Manors.

WORKED ALL ASIAN AWARD

The WAAA program requires the applicant to work other amateurs in the member countries of the Association of Southeast Asian Nations. Work 5 Philippine contacts, 1 Malaysian contact, 2 Indonesian contacts, 1 in Thailand, and 1 station in Singapore. Special endorsements will be given for All-Phone, All-CW, Single-Band, and Five-Band contacts.

Have your list of contacts verified by at least two radio-club officials and be sure all contacts were made after January 1, 1970, to be valid. Forward appropriate logbook information in your application along with $4.00 (US funds only, no IRCs) to the Award Manager: Edwin Zambrano DU1EFZ, PO Box AC-166, Quezon City 3001, Philippines.

WORKED ALL DU AWARD

This award is available to all licensed amateurs who can show proof of having contacted at least one station from each of the call areas in the Republic of the Philippines (DU1 to DU9, except DU5).

Contacts may be made on any band or mode and special endorsements will be issued upon request for All-Phone, All-CW, Single-Band, or Five-Band accomplishments.

Contacts for the DU Award must be made on or after January 1, 1970. To apply, forward a list of contacts which have been verified by two officers of a radio organization. Your application must show all logbook information for each contact. Send the list and $4.00 (US funds only—no IRCs, please!) to: Edwin Zambrano DU1EFZ, PO Box AC-166, Quezon City 3001, Philippines.

VK1 ACHIEVEMENT AWARD

The A.C.T. Division of the Wireless Institute of Australia is proud to announce the creation of its newest award, the VK1 Achievement Award. This award has the aim of increasing interest in the VK1 prefix and in promoting Canberra and Australia internationally.

As there are only 300 VK1 licensees, the award will not be an easy one to achieve, particularly on some bands and modes. The VK1 Award is available to licensed amateurs throughout the world. To qualify, stations within Australia must work 20 stations in VK1 land on HF and on VHF. Stations outside Australia must work a minimum of 10 VK1 stations for the HF segment of the award.

To apply, submit your list of contacts, including the GMT time and date worked, the band and mode of operation, and any reports or ciphers exchanged. To be valid, all contacts must be made on or after January 1, 1978. Endorsements may be given at the time application is made. Five IRCs or $2.00 in Australian currency cover the cost of the award and should be sent to the Award Manager, c/o WIA, PO Box 46, Canberra A.C.T. 2600, Australia.

By the way, the VK1 Award is also made available to shortwave listening stations on a heard basis. QSL confirmation is required.

WORKED ALL FORGOTTONIA

Announcing the awards program sponsored by LEARC, the Lamoine Emergency Amateur Radio Club of Macomb, Illinois. The Worked Forgottonia Award is issued to amateurs who confirm contact with three (3) licensed amateurs of Forgottonia. The Worked All Forgottonia Award is issued to operators confirming contact with at least one amateur in each of the sixteen counties of Forgottonia.

What is Forgottonia? It is the 51st state! It consists of the following counties (formerly west central Illinois): Adams, Brown, Calhoun, Cass, Fulton, Greene, Hancock, Henderson, Knox, McDonough, Mercer, Morgan, Pike, Schuyler, Scott, and Warren.

All contacts must be made after June 28, 1980, to be valid. From the letter we received from the club, the award evidently is issued at no charge since no remittance was mentioned. Forward your list of verified contacts and a 9" × 12" SASE to the attention of AG9Y, c/o LEARC, 1224 Maple Avenue, Macomb IL 61455.

WAT AWARD

The Cabin Fever Radio Club of Tok, Alaska, offers a certificate for contacting three amateurs in Tok. There are no band or mode restrictions. However, all contacts must be made after December 15, 1980, to be considered valid.

To apply, prepare a list of contacts in order by callsign. Include the name of the station operator, the date and time worked in GMT, and the mode and band of operation. QSLs not required. Amateurs located in Tok include AL7O, AL7BO, AL7BV, and WL7APG.

Send your application with $2.00 or 10 IRCs to: Cabin Fever Radio Club, Box 451, Tok AK 99780.

BASEBALL SPECIAL

The Lewis-Clark ARC will operate W7VJD Friday, June 1, from 0200Z until the last game has been played, Saturday, June 2, from 1600Z until last game played, and Sunday, June 3, from 1600Z until last

game played, during the NAIA World's Collegiate Baseball Tournament, on the campus of Lewis-Clark State College.

Frequencies: 14.270, 7.235, 3.940 ± QRM phone; 14.130, 7,125 ± QRM CW.

Please send SASE for QSL via Dan Wenstrom WB7BQV, 630 Stewart, Lewiston ID 83501.

EIGHTH STREET FESTIVAL

The Madison County Amateur Radio Club will operate the club station, W9VCF, portable from the historic Eighth Street Festival in Anderson, Indiana, on June 8 and 9, 1984. A special certificate will be offered to persons contacting the club station during the festival or any club member during the month of June. Suggested operating frequencies are: 28.785, 21.400, 14.340, 7.290, and 3.990 MHz.

Send log information and a dollar donation to: Madison County ARC, c/o Frank M. Dick WA9JWL, 921 Isabelle Drive, Anderson IN 46013.

SPECIAL-EVENTS STATION 7SK0AC

The Swedish Telecommunications Administration has given permission to the Swedish Radio Amateur Radio Club to use the special-events prefix 7SK in connection with operations from the club station, SK0AC, during the annual conference of the European DX Council in Stockholm, June 8–10, 1984. The EDXC is the umbrella organization of the shortwave radio listening clubs in Europe. The annual conference has become *the* meeting place in Europe for international broadcasters who are actively involved in programming or the technical side of international radio and the representatives of the listeners' clubs, which can now boast more than thirty thousand members.

The 1984 conference is being hosted by Radio Sweden International and the Swedish DX Federation at the studios of RSI in Stockholm. 7SK0AC will be on the air during the conference, operated by members of the club and licensed amateurs among the conference participants. Among those who are expected to operate from the station are Victor Goonetilleke 4S7VK, Colin Richards 9M2FJO, Lars Rooth HV3SJ, Wolf Harranth OE1WHC, and Bernt Erfjord LA5TBA.

7SK0AC is expected to go on the air at about 1500 hours GMT on Friday, June 8, 1984. Operation will continue at various times during the conference on Saturday, June 9, and Sunday, June 10. Frequencies to be used during daylight hours are 14060 kHz (CW), 14320 kHz (SSB), 21060 kHz (CW), and 21350 kHz (SSB); and during hours of darkness, 3550 kHz (CW) and 3700 kHz (SSB).

There will also be some operation on the 2-meter band.

MECA

The Macomb Emergency Communications Association will have its second special event on the weekend of June 8–10. Operation will commence at 2200Z Friday, June 8, and continue around the clock to 2200Z Sunday, June 10, near the lower end of the General-class portion of each amateur band as propagation dictates. Modes of operation will be SSB and CW/RTTY on HF and FM phone on 146.07/.67. QSL to MECA, Box 488, Utica MI 48087 with a 9" × 12" SASE for certificate. DX stations need send only QSL.

BROOKFIELD ZOO

The Chicago Suburban Radio Association will operate special-event radio station N9BAT from the Brookfield Zoo in celebration of its 50th anniversary. It is one of the largest zoos in the United States and was the first American zoo to exhibit animals in naturalistic displays behind moats instead of in cages. Its Tropic World is the largest zoo building in the world, housing African, Asian, and South American rain forests.

Operation will be June 9 and 10 from 1600Z–2400Z, using the phone frequencies of 7.250 and 14.250 MHz. A special full-color zoo QSL card will be available to all stations that reply with their QSL card and a #10 (business-size) SASE to: N9BAT Special Event, PO Box 383, Brookfield IL 60513.

KNOX COUNTY ARC

The Knox County Amateur Radio Club will have a special-event station on the air to commemorate Galesburg Railroad Days. Railroad Days is an annual event for Galesburg, Illinois, which pays tribute to the role of the Burlington Northern (formerly the CB & Q) and the Sante Fe Railroads in the development of the area.

The KCARC will have its special-event station on the air on Saturday and Sunday, June 9 and 10, 1984, from 1300Z 'til 2200Z. The station will operate on one of the following frequencies: 7.235, 14.280, 21.375, and 28.630 MHz, plus or minus QRM and depending on band conditions. The call of the station will be W9GFD. A special commemorative QSL card will be sent to any station contacted which sends an SASE to the Knox County ARC, Inc., W9GFD, 1694 Bluebird Drive, Galesburg IL 61401.

HELEN KELLER DAYS

The Muscle Shoals ARC will operate W4JNB from 1600–2100Z on June 29 and 30 and July 1, 1984, from Spring Park, Tuscumbia, Alabama, in celebration of Helen Keller Festival Days. Phone frequencies are 7270–7290 and 14,280–14,295. For an 8" × 10" certificate, send an SASE (4" × 10" envelope) to Box 2745, Muscle Shoals AL 35662. Talk-in on two meters, 146.01/.61.

TOM SAWYER DAYS

The Hannibal Amateur Radio Club, Inc., will issue a fourth annual special certificate from the National Tom Sawyer Days celebration in Mark Twain's boyhood home town, Hannibal, Missouri, on Saturday, June 30 and Sunday, July 1, 1984. Hours: 1500–2100 UTC both days. Frequencies: phone 7.245, 14.290, 21.400, 28.770; and CW 7.125 and 21.125 MHz. Help us celebrate!

To receive the certificate, send a large (8 × 10) SASE and your personal QSL card confirming the contact to Hannibal Amateur Radio Club, Inc., W0KEM, 2108 Orchard Avenue, Hannibal MO 63401.

For further information, call Tony McUmber, 2108 Orchard Avenue, Hannibal MO 63401; (314)-221-6199.

ANNIE OAKLEY DAYS

W8UMD, the Treaty City ARA, will operate the Annie Oakley special-event station from 1400Z July 28 to 0200Z July 29, and 1400Z to 2200Z July 29. Frequencies will be 3910 kHz, 7235 kHz, and 14285 kHz. Send 9" × 12" SASE for unfolded certificate; otherwise send #10 SASE to TCARA, PO Box 91, Greenville OH 45331.

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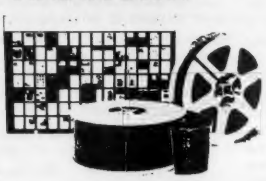

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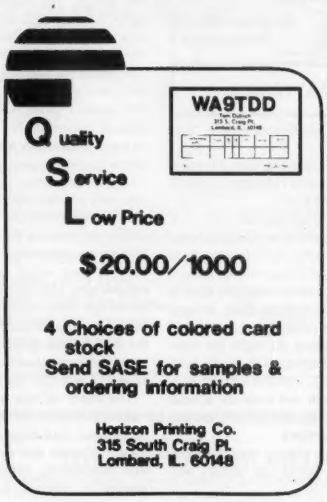

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LETTERS

YES, IT WAS

Was that the same Ishmod Kaduk, the great explorer, who found the extension of Lake Michigan into Montana?

Roger Coppock
Bradview IL

OH YES HE WAS

Ishmod may not have been a fool, but I read up to p. 224 before I realized it was April!

Harry Church W8KXP
Lebanon IL

ISHMOD FOOLED AGAIN

The article on Ishmod's Journal (*73*, April, 1984) is one of the finest exposés on the potential perils of the DXpedition ever written. Reading it positively started my heart pounding with the desire to go rent an old Argentine aircraft carrier, hire a crew of Lascars and Dacoits, and get out among 'em. There is, however, a problem with the map you printed and the geography of the DXpedition in general. Some of my irregular friends will claim that the map you printed was originally made near Agra by Jonathan Small, Abdullah Khan, Mahomet Sing, and Dost Akbar, in the late 1870s. Others will attribute the map to a certain seagoing Bellman of the same period, citing these lines (see box).

Unfortunately, the map is a red herring. The true location of the island Ishmod and his friends found is, I am afraid, more sinister. The island where Ishmod and his friends landed can be none other than the dread R'lyeh which rises occasionally from the dark waters of the South Pacific and Indian Oceans. This island was first documented in English by H. P. Lovecraft, in 1928. It also is mentioned by the 15th century Arab scholar, Abdul Alhazred in his *Necronomicon*. (Copies of the *Necronomicon* can be found in the Widener Library at Harvard and in the library crypt at Miskatonic University in Arkham, Massachusetts.) As further evidence, note the parallels between the log of the Brig *Emma* cited by Lovecraft and Ishmod's last printed words. Ishmod speaks of phenomena which defied the laws of physics. In the *Emma* log, we hear Johansen speak of geometry which was "abnormal, non-Euclidean, and loathsomely redolent of spheres and dimensions apart from ours." The partially complete reference to the rocks of the island also correlates with the Lovecraft account of unbelievable greenish stone blocks at R'lyeh.

From the above discussion, I think it clear that Ishmod and his friends have fallen prey to Cthulhu or some other of the star-born Old Ones. Only the other day on one of the Pacific DX nets I heard at about 35 wpm the horrid refrain, "Ph'nglui mglw'nafh Cthulhu R'lyeh wgah'nagl fhtagn." I fear for my fellow hams on other Pacific and Indian Ocean DXpeditions. They should take great care.

Henry P. Dowst KA6KNJ
Pacific Palisades CA

THANKS, *73*

Just a short note to thank you for *73*. I have been a ham for only one year and have found *73* to be excellent reading with enough "beginner" projects to keep my interest high and my curiosity aroused.

I am not very adept at the technical aspects of amateur radio yet, but the projects in *73* are educating me and encouraging me to learn by doing.

Also, I think your editorials are terrific. It's been a long time since I've enjoyed reading someone's philosophy who has the courage to tell people the real facts of life; that is, "if you want something, go after it and earn it!" Thanks for reaffirming my belief in the spirit that once made this country great. I hope more people begin to re-apply this attitude.

Keep up the good work!

Gary Mills KB4ENG
Middlesboro KY

WET BATTERIES

Reference is made to your article, "Wet Battery Quiz."

First of all, smartass that I am, I'll admit I flunked the quiz. And I thought I knew it all, like the subtitle said.

I think I can clear up your author's comprehension on a couple of related points. He asks, "How could the concrete floor get through the acid-impervious case?" The time-honored advice to not so store a lead/acid battery is correct. Such storage frequently implies storage in an unheated garage or outbuilding. At night the temperature of the battery and floor both drop. In the morning, with the battery in intimate contact with the floor as a heat sink, warm moist air will cause condensation on the exterior case.

He is correct in stating that the acid path across the top of the battery will cause leakage.

He asks, "How come the acid inside the case does not cause current leakage?" Fair question. Here is my answer: First of all, think of a 2-volt cell as two "half-cells" with the gross part of the acid between them as a conductor and the acid in intimate contact with each cathode or anode as highly ionized and a component of the half-cell. With this concept it can be realized that an acid path across external terminals of greater potential than 2 volts will indeed cause a current to flow. And to make the case crystal clear to anyone still doubting, the highly-ionized interface between the conducting acid and the terminal "plates" out as a different colored chemical depending on the terminal polarity. White negative, and green positive.

I hope this clears up his understanding; it has mine. Thanks for a great article. I am an Old Car Nut, and between winter storage and summer heat and overcharging of these animals, what I have learned will be put to good use immediately.

William T. Tyrrel W2YKG
East Northport NY

SUPPORT YOUR NET

This is the first letter that I have written to you for publishing and I suppose that not all amateurs will agree, but I do know that the message needs to be gotten across. I suppose that the best title for this would be "An Open Letter to All Amateurs." I am not the best at spelling nor am I convinced that this will even be published, but I thought that I would at least make an attempt.

I have been a ham for around 8 years now and, like many hams, spend very little time on the air. An incident happened to me, though, that inspired me to write this letter. I had a QSO with a Mexican amateur station, and by coincidence he had a very good friend in a small town in Tennessee whom he had not been able to contact. Having checked into the Tennessee Net several times, I knew that I had a chance to contact his friend, so I offered to pass a message and see if I could arrange to get the two together on a 15- or 20-meter frequency. My Mexican amateur was very excited about this, although he didn't understand the net type of operation or its purpose. On March 8th, 1984, it just so happened that there was another ham in that small community in Tennessee who also was on the same phone exchange. Not only was I able to get the message across to my Mexican's friend, but also he was going to meet him on the air at the same time that I had arranged a schedule with him the following Saturday.

The moral of this story is, *please*, no matter how large a community you belong to, *support your local state net*! I had no idea that there was even another ham in that community, other than the one I needed to contact, but there was, and because he devoted thirty minutes of his time to be on the net, I was able to get two good friends together and back on track. Whether it is across the state, country, or world, the nets serve a very important purpose but are useless unless they have the support of the hams in the state and communities and counties of the state. It may be that you may never be called upon for traffic to your area, but what a blessing it is when you need an area and you can immediately get that area and pass the message.

I have heard many negative comments about the nets, how trivial they are, and that they serve no purpose, but believe me, one such use as I had and the net takes on a whole new meaning. I hate to hear the negative comments on how bad nets are conducted. It may be that a certain net control is bad or a certain net is inconsistent, but as amateurs we all owe it to ourselves to make an effort to learn proper net procedures—both CW and SSB. Some time, devote one night of the week to your state's net and get to know the net controls and the purpose of the nets, the time they meet, and most of all how you can contribute. I would like personally to charge all amateurs to help promote the best public service that we, as amateurs, can provide, and *get involved*. If you don't because of the lack of net procedures, write the editors of this publication or any ARRL official and I know that they will be glad to assist you. The message needs to get out, and an amateur's time cannot be put to better use than trying to help his fellow amateurs and the public by net participation.

Gary B. Kendrick KW4Z
Chattanooga TN

He had brought a large map representing the sea,
Without the least vestige of land:
And the crew were much pleased when they found it to be
A map they could all understand.

"What's the good of Mercator's North Poles and Equators,
Tropics, Zones, and Meridian Lines?"
So the Bellman would cry: and the crew would reply
"They are merely conventional signs!"

"Other maps are such shapes with their islands and capes!
But we've got our brave Captain to thank"
(So the crew would protest) "that he brought us the best—
A perfect and absolute blank!"

From "A Nautical Ballad," Charles Carryl, 1841–1920.

TWO-METER BEACON

The Lincoln Communications Society, Lincoln, Nebraska, has constructed a beacon transmitter to provide a signal for propagation studies and frequency reference. The beacon currently operates A1 (CW) on 144.055 MHz with an output power of 10 Watts to an omnidirectional antenna. The beacon location is in the northeast corner of grid square EN-10. The ID callsign is WB0QIY/B. Reception reports should be sent to me at the Lincoln Communications Society.

Charles Connor K0NG
Secretary
1801 So. 48th St.
Lincoln NE 68506

FAR OUT, FAROUT ARC!

On September 17, 1983, I worked Ruthann WD8BMK, who was operating special-event station WB8SMC in celebration of the 10th Anniversary of the Farout Amateur Radio Club located in Dayton, Ohio.

We exchanged the QSLs and on March 3, 1984, I received a beautiful personalized plaque as a token of the club's thanks for being a part of their celebration. Three QSLs had been drawn at random, and I was lucky to be one of them.

I would like to publicly thank the Farout Amateur Radio Club very much. A club like this that takes that extra step has to go *far*!! May they have 100 more anniversaries!

Richard C. Schott KA2PHQ
Spencerport NY

DX WORLD

Recently a program I wrote appeared in *73* (February, 1984), "Put the DX World On the Screen." I would like to thank all the many people that wrote me with their comments, suggestions, and their orders. The real pay in doing a project like this is the thanks that I receive from all my fellow hams; Lord knows the money isn't worth it. I hope that all the people who received my program were pleased with what they received.

As many people already know, I did a rewrite of the Prefix Locator program for the

Commodore 64. I added many features to it that you will not find in the VIC version. Let me list some of the added features.

- A more expanded data list, including cities and all the states in the US of A.
- Two clocks, one local and one GMT.
- User-selectable screen, border, and print colors.
- An MUF forecast in local time and GMT time.
- Printer output routines.
- A machine-language data-search routine. Now data searches take three to five seconds instead of three to four minutes.
- And, recently added, is a sunrise and sunset calculation routine.

This version is available from me or from RAK Electronics. The C64 version is available on tape or disk. A C64 version of one form or another has been available since November, 1983. The C64 version has been updated several times and some older versions don't have all the features mentioned above.

Eugene Morgan WB7RLX
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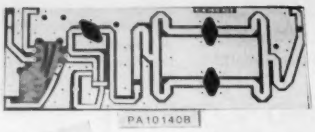

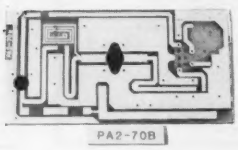

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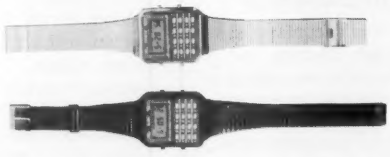

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MRF502	1.04
MRF503	6.00
MRF504	7.00
MRF509	5.00
MRF511	10.69
MRF515	2.00
MRF517	2.00
MRF559	2.05
MRF605	20.00
MRF618	25.00
MRF628	8.65
MRF629	3.45
MRF644	27.60
MRF646	29.90
MRF816	15.00
MRF823	20.00
MRF901 (3) Lead	1.00
MRF901 (4) Lead	2.00
MRF904	2.30
MRF911	3.00
MRF961	2.30
MRF8004	2.10
MS261F	POR
MSC1720-12	225.00
MSC1821-3	$125.00
MSC1821-10	225.00
MSC2001	40.00
MSC2223-10	200.00
MSC3000	50.00
MSC3001	50.00
MSC73001	50.00
MSC82001	40.00
MSC82014	40.00
MSC82020	40.00
MSC82030	40.00
MSC83001	50.00
MSC83005	100.00
MT4150	14.40
MT5126	POR
MT5596/2N5596	99.00
MT5768/2N5768	95.00
MT8762	POR
NE02136	2.50
NE13783	POR
NE21889	POR
NE57835	5.70
NE73436	2.50
TRW	
PRT8637	POR
PT3190	POR
PT3194	POR
PT3195	POR
PT3537	7.80
PT4166E	POR
PT4176D	POR
PT4186B	POR
PT4209	POR
PT4209C/5645	POR
PT4556	24.60
PT4570	7.50
PT4577	POR
PT4590	POR
PT4612	POR
PT4628	POR
PT4640	POR
PT4642	POR
PT5632	4.70
PT5749	POR
PT6629	POR
PT6709	POR
PT6720	POR
PT8510	POR
PT8524	POR
PT8609	POR
PT8633	POR
PT8639	POR
PT8659	POR
PT8679	POR
PT8708	POR
PT8709	POR
PT8727	29.00
PT8731	POR
PT8742	19.10
PT8787	POR
PT9783	16.50
PT9784	32.70
PT9790	56.00
PT31962	POR
PT31963	POR
PT31083	POR
PTX6680	POR
RCA	
40081	5.00
40279	10.00
40280	4.62
40281	10.00
40282	20.00
40290	2.80
40292	13.05
40294	2.50
40341	21.00
40608	2.48
40894	1.00
40977	10.00
62800A	60.00
RE3754	25.00
RE3789	25.00
RF110	25.00
S50-12	25.00
S3006	5.00
S3031	5.00
SCA3522	5.00
SCA3523	5.00
PRICE ON REQUEST = POR	

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GaAs, TUNNEL DIODES, ETC.

* R F TRANSISTORS *

TYPE	PRICE	TYPE	PRICE	TYPE	PRICE	TYPE	PRICE
THONSON CSF						SD1453-1	$48.00
SD345	$ 5.00	SD1119	$ 5.00	SD1278-5	$18.00	SD1454-1	48.00
SD445	5.00	SD1124	50.00	SD1281-2	8.00	SD1477	48.00
SD1004	15.00	SD1127	3.50	SD1283	10.00	SD1478	21.00
SD1009	15.00	SD1133	14.00	SD1289-1	15.00	SD1480	60.00
SD1009-2	15.00	SD1133-1	14.00	SD1290-4	15.00	SD1484	1.50
SD1012	9.90	SD1134-1	3.00	SD1290-7	15.00	SD1484-5	1.50
SD1012-3	9.90	SD1135	8.00	SD1300	3.00	SD1484-6	1.50
SD1012-5	9.90	SD1136	15.00	SD1301-7	3.00	SD1484-7	1.50
SD1013-3	13.50	SD1136-2	15.00	SD1305	3.00	SD1488	39.00
SD1013-7	13.50	SD1143-1	12.00	SD1307	3.00	SD1488-1	28.00
SD1014	11.00	SD1143-3	17.00	SD1308	3.00	SD1488-7	27.00
SD1014-6	11.00	SD1144-1	3.00	SD1311	1.00	SD1488-8	28.00
SD1016	15.00	SD1146	15.00	SD1317	10.00	SD1499-1	39.00
SD1016-5	15.00	SD1147	15.00	SD1335	3.00	SD1520-2	18.00
SD1018-4	15.00	SD1188	10.00	SD1345-6	5.00	SD1522-4	33.00
SD1018-6	15.00	SD1189	24.00	SD1365-1	2.50	SD1528-1	24.00
SD1018-7	15.00	SD1200	1.50	SD1365-5	2.50	SD1528-3	34.00
SD1018-15	15.00	SD1201-2	10.00	SD1375	7.50	SD1530-2	38.00
SD1020-5	10.00	SD1202	10.00	SD1375-6	7.50	SD1536-1	41.00
SD1028	15.00	SD1212-11	4.00	SD1379	15.00	SD1545	34.00
SD1030-2	12.00	SD1212-12	4.00	SD1380-1	1.00	SD1561	79.00
SD1043	12.00	SD1212-16	4.00	SD1380-3	1.00	SF4557 Mot.	25.00
SD1043-1	10.00	SD1214-7	5.00	SD1380-7	1.00	SK3048 RCA	5.00
SD1045	3.75	SD1214-11	5.00	SD1405	40.00	SK3177 RCA	15.00
SD1049-1	2.00	SD1216	12.00	SD1409	18.00	SMS7714 Mot.	2.50
SD1053	4.00	SD1219-4	15.00	SD1410	22.00	SRF750 Mot.	36.00
SD1065	4.75	SD1219-5	15.00	SD1410-3	21.00	SRF1018 Mot.	5.00
SD1088	15.00	SD1219-8	15.00	SD1413-1	18.00	SRF2147 Mot.	22.00
SD1074-2	18.00	SD1220	8.00	SD1416	50.00	SRF2356 Mot.	38.00
SD1074-4	28.00	SD1220-9	8.00	SD1422-2	24.00	SRF2378 Mot.	16.00
SD1074-5	28.00	SD1222-8	16.00	SD1428	33.00	SRF2584 Mot.	40.00
SD1076	20.00	SD1222-11	7.50	SD1429-2	15.00	SRF2821 Mot.	25.00
SD1077-4	4.00	SD1224-10	18.00	SD1429-3	15.00	SRF2857 Mot.	20.00
SD1077-6	4.00	SD1225	18.00	SD1429-5	15.00	TA8894 RCA	15.00
SD1078-6	24.00	SD1228-8	POR	SD1430	12.00	TIS189/MRF966	3.55
SD1080-8	6.00	SD1229-7	13.00	SD1430-2	18.00	TP312	2.50
SD1080-9	3.00	SD1229-16	13.00	SD1434-5	30.00	TP1014 TRW	5.00
SD1084	8.00	SD1232	4.00	SD1434-9	30.00	TP1028 TRW	15.00
SD1087	15.00	SD1240-8	15.00	SD1438	26.00	01-80703T04/	
SD1089-5	15.00	SD1244-1	14.00	SD1441	91.00	458-949 Mot.Comm.	65.00
SD1095	15.00	SD1262	12.00	SD1442	15.00	TXVF2201 H.P.	450.00
SD1100	5.00	SD1263	15.00	SD1444	6.00	62803 RCA	100.00
SD1109	18.00	SD1263-1	15.00	SD1444-8	6.00	TA7205/2N5921	80.00
SD1115-2	8.00	SD1272	13.00	SD1450-1	28.00	TA7487/2N5920	75.00
SD1115-3	8.00	SD1272-2	15.00	SD1451	18.00	TA7995/2N6267	150.00
SD1115-7	2.50	SD1272-4	15.00	SD1451-2	18.00	SRF2092 Mot.	18.00
SD1116	5.00	SD1278	20.00	SD1452	20.00	MRF479	8.05
SD1118	22.00	SU1278-1	18.00	SD.452-2	20.00		

We Can Cross Reference Most RF Transistors, Diodes, Hybrid Modules And Any Other Type Of Semiconductor.

****

* DIODES (HOT CARRIER,MICROWAVE,PIN,SCHOTTKY,TUNNEL,VARACTOR,GUNN) *

1N21	$ 3.40	1N21B	$ 3.40	1N21BR	$ 3.40	1N21C	$ 3.40
1N21D	4.00	1N21DR	4.00	1N21ER	6.00	1N21RF	5.00
1N21WE	5.80	1N21WG	5.80	1N22	5.00	1N23A	10.00
1N23B	3.40	1N23C	3.40	1N23CR	3.40	1N23D	4.95
1N23DR	4.00	1N23WE	5.00	1N25	7.50	1N25AR	18.00
1N28WE	10.00	1N29	10.00	1N32	20.00	1N53A	55.50
1N76	26.00	1N76R	28.00	1N78	26.00	1N78A	20.00
1N78B	26.00	1N78D	28.00	1N78DR	28.00	1N78R	28.00
1N149	6.00	1N150MR	18.00	1N415	4.00	1N415C	4.00
1N415G	15.00	1N416D	5.00	1N416E	6.00	1N446	10.00
1N831	10.00	1N833	10.00	1N950	4.00	1N1084	2.00
1N2930	15.00	1N2932	15.00	1N3540	15.00	1N3712	11.00
1N3713	18.00	1N3714	11.00	1N3715	16.00	1N3716	10.00
1N3717	14.00	1N3718	10.00	1N3721	14.00	1N3733	10.00
1N3747	21.00	1N4386	20.00	1N4396	15.00	1N4785	11.00
1N4812B	9.00	1N5139A/B	4.25	1N5140A/B	4.25	1N5141A/B	4.25
1N5142A/B	4.25	1N5143A/B	4.25	1N5144A/B	4.25	1N5145A/B	4.25
1N5146A/B	4.25	1N5147A/B	4.25	1N5148A/B	4.25	1N5167	5.50
1N5453	3.75	1N5465	7.65	1N5711	1.00	1N5711 JAN	2.00
1N5713	5.00	1N5767	2.00	1N6263	1.00	1S2199	15.00
1S2200	15.00	1S2208/9	1.00	881087/48R889558	65.00	8D3020	65.00
A2X116M Aertech	50.00	BB105B	1.00	BB105G	1.00	HD4/4JFHD4 G.E.	15.00
BL161 Bomac	5.00	CMD514AB C.M.	POR	D4080 Alpha	POR	D4159 Alpha	POR
D4233B Alpha	POR	D4900 Alpha	POR	D4959 Alpha	POR	D4987M Alpha	POR
D5047C Alpha	POR	D5147D Alpa	POR	D5503 Alpha	POR	D5506 Alpha	POR
DGB6158-98 Alpha	POR	DMD6022 Alpha	POR	DMD6460A Alpha	POR	DP20054 Crown	POR
GC1691-89 GHZ	31.35	GC1602-89 GHZ	31.35	GC1607-40 GHZ	31.35	GC2531-88 GHZ	37.40
GC2542-46 GHZ	37.40	GC3208-40 GHZ	37.40	GC17044 GHZ	50.00	HP33644A-H01	125.00
HP5082-0112	14.20	HP5082-0241	75.60	HP5082-0253	105.00	HP5082-0320	58.00
HP5082-0375	POR	HP5082-0386	POR	HP5082-0401	POR	HP5082-0438	POR
HP5082-1028	POR	HP5082-1332	POR	HP5082-2254	POR	HP5082-2302	10.70
HP5082-2303	5.20	HP5082-2696	POR	HP5082-2711	23.15	HP5082-2727	POR
HP5082-2800	1.00	HP5082-2805	4.45	HP5082-2835	1.00	HP5082-2884	POR
HP5082-3039	6.70	HP5082-3040	36.00	HP5082-3080	2.00	HP5082-3188	1.00
HP5082-3379	1.50	HP5082-6459	POR	HP5082-6462	POR	HP5082-6888	POR
HP5082-8016	POR	HP5082-8323	POR	K3A Kemtron	7.00	MA450A	POR
MA475	POR	MA40008	POR	MA41487	POR	MA41765	POR
MA41766	POR	MA43004	48.00	MA43589	POR	MA43622	POR
MA43636	POR	MA45104	27.00	MA47044	POR	MA47051	25.50
MA47100	3.05	MA47202	30.80	MA47771	POR	MA47838*	POR
MA47852	POR	MA49106	37.95	MA49558	POR	MA86731	125.00

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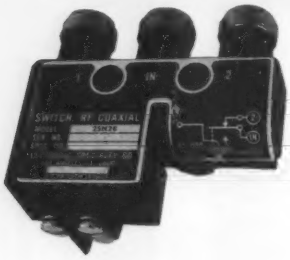
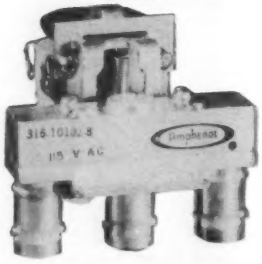
COAXIAL RELAY SWITCHES SPDT

Electronic Speciaity Co./Raven Electronics FSN 5985-556-9683 $49.00
Part # 25N28 Part # SU-01
26Vdc Type N Connector, DC to 1 GHz.



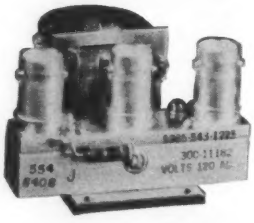
Amphenol
Part # 316-10102-8
115Vac Type BNC DC to 3 GHz.

$29.99



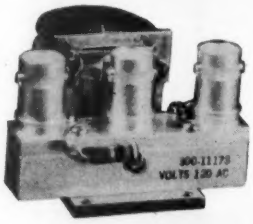
FXR
Part # 300-11182
120Vac Type BNC DC to 4 GHz.
FSN 5985-543-1225

$39.99



FXR
Part # 300-11173
120Vac Type BNC Same
FSN 5985-543-1850

$39.99



BNC To Banana Plug Coax Cable RG-58 36 inch or BNC to N Coax Cable RG-58 36 inch.

$7.99 or 2 For $13.99 or 10 For $50.00 $8.99 or 2 For $15.99 or 10 For $60.00

SOLID STATE RELAYS

P&B Model ECT1DB72 PRICE EACH $5.00	5vdc turn on	120vac contact at 7amps or 20amps on a 10"x 10"x .124 aluminum. Heatsink with silicon grease.
Digisig, Inc. Model ECS-215 PRICE EACH $7.50	5vdc turn on	240vac contact 14amps or 40amps on a 10"x 10"x .124 aluminum. Heatsink with silicon grease.
Grigsby/Barton Model GB7400 PRICE EACH $7.50	5vdc turn on	240vac contact at 15amps or 40amps on a 10"x 10"x .124 aluminum. Heatsink with silicon grease.

NOTE: *** Items may be substituted with other brands or equivalent model numbers. ***

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RECALL PHONE MEMORY TELEPHONE WITH 24 NUMBER AUTO DIALER

The Recall Phone Telephone employs the latest state of art communications technology.It is a combination telephone and automatic dialer that uses premium-quality,solid-state circuitry to assure high-reliability performance in personal or business applications. $49.99

ARON ALPHA RAPID BONDING GLUE

Super Glue #CE-486 high strength rapid bonding adhesive.Alpha Cyanoacrylate.Set-Time 20 to 40 sec.,0.7fl.oz.(20gm.)
$2.00

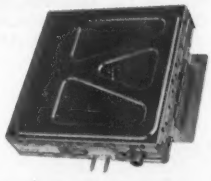
TOUCH TONE PAD

This pad contains all the electronics to produce standard touch-tone tones. New with data.

$9.99 or 10/$89.99

MITSUMI UHF/VHF VARACTOR TUNER MODEL UVE1A

Perfect for those unscrambler projects. New with data.



$19.99 or 10/$149.99

INTEGRATED CIRCUIT.		1 to 10	11up
MC1372P	Color TV Video Modulator Circuit.	$ 4.42	$2.95
MC1358P	IF Amp.,Limiter,FM Detector,Audio Driver,Electronic Attenuator.	5.00	4.00
MC1350P	IF Amplifier	1.50	1.25
MC1330A1P	Low Level Video Detector	1.50	1.15
MC1310P	FM Stereo Demodulator	4.29	3.30
MC1496P	Balanced Modulator/Demodulator	1.50	1.25
LM565N	Phase Locked Loop	2.50	2.00
LM380N14	2Watt Audio Power Amplifier	1.56	1.25
LM1889N	TV Video Modulator	5.00	4.00
NE564N	Phase Locked Loop	10.00	8.00
NE561N	Phase Locked Loop	10.00	8.00

FERRANTI ELECTRONICS AM RADIO RECEIVER MODEL ZN414 INTEGRATED CIRCUIT.
Features:
1.2 to 1.6 volt operating range.,Less than 0.5ma current consumption. 150KHz to 3MHz Frequency range.,Easy to assemble,no alignment necessary. Effective and variable AGC action., Will drive an earphone direct. Excellent audio quality.,Typical power gain of 72dB.,TO-18 package. With data. $2.99 or 10 For $24.99

NI CAD RECHARGEABLE BATTERIES

AA Battery Pack of 6 These are Factory New. $5.00

SUB C Pack of 10 2.5Amp/Hr. $10.00

Gates Rechargeable Battery Packs

12vdc at 2.5Amp/Hr. $11.99
12vdc at 5Amp/Hr. $15.99

MOTOROLA MRF559 RF TRANSISTOR
hfe 30min 90typ 200max.
ft 3000mhz
gain 8db min 9.5typ at 870mhz
13db typ at 512mhz
output power .5watts at 12.5vdc at 870mhz.

$2.05 or 10/$15.00

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"SOCKETS AND CHIMNEYS"

EIMAC TUBE SOCKETS AND CHIMNEYS

		$POR
SK110	Socket	
SK300A	Socket For 4CX5000A,R,J, 4CX10,000D, 4CX15,000A,J	$520.00
SK400	Socket For 4-125A,250A,400A,400C,4PR125A,400A,4-500A,5-500A	260.00
SK406	Chimney For 4-250A,400A,400C,4PR400A	74.00
SK416	Chimney For 3-400Z	36.00
SK500	Socket For 4-1000A/4PR1000A/B	390.00
SK600	Socket For 4CX250B,BC,FG,R,4CX350A,F,FJ	51.00
SK602	Socket For 4CX250B,BC,FG,R,4CX350A,F,FJ	73.00
SK606	Chimney For 4CX250B,BC,FG,R,4CX350A,F,FJ	11.00
SK607	Socket For 4CX600J,JA	60.00
SK610	Socket For 4CX600J,JA	60.00
SK620	Socket For 4CX600J,JA	66.00
SK626	Chimney For 4CX600J,JA	10.00
SK630	Socket For 4CX600J,JA	66.00
SK636B	Chimney For 4CX600J,JA	34.00
SK640	Socket For 4CX600J,JA	36.00
SK646	Chimney For 4CX600J,JA	71.00
SK700	Socket For 4CX300A,Y,4CX125C,F	225.00
SK711A	Socket For 4CX300A,Y,4CX125C,F	225.00
SK740	Socket For 4CX300A,Y,4CX125C,F	86.00
SK770	Socket For 4CX300A,Y,4CX125C,F	86.00
SK800A	Socket For 4CX1000A,4CX1500B	225.00
SK806	Chimney For 4CX1000A,4CX1500B	40.00
SK810	Socket For 4CX1000A,4CX1500B	225.00
SK900	Socket For 4X500A	300.00
SK906	Chimney For 4X500A	57.00
SK1420	Socket For 5CX3000A	650.00
SK1490	Socket For 4CV8000A	585.00

JOHNSON TUBE SOCKETS AND CHIMNEYS

124-111/SK606	Chimney For 4CX250B,BC,FG,R, 4CX350A,F,FJ	$ 10.00
122-0275-001	Socket For 3-500Z, 4-125A, 250A, 400A, 4-500A, 5-500A	(pair)15.00
124-0113-00	Capacitor Ring	15.00
124-116/SK630A	Socket For 4CX250B,BC,FG,R, /4CX350A,F,FJ	55.00
124-115-2/SK620A	Socket For 4CX250B,BC,FG,R, /4CX350A,F,FJ	55.00
	813 Tube Socket	20.00

TUBE CAPS (Plate)

HR1, 4	$11.00
HR2,3, 6 & 7	13.00
HR5, 8	14.00
HR9	17.00
HR10	20.00

CHIP CAPACITORS

.8pf	10pf	100pf*	430pf
1pf	12pf	110pf	470pf
1.1pf	15pf	120pf	510pf
1.4pf	18pf	130pf	560pf
1.5pf	20pf	150pf	620pf
1.8pf	22pf	160pf	680pf
2.2pf	24pf	180pf	820pf
2.7pf	27pf	200pf	1000pf/.001uf*
3.3pf	33pf	220pf*	1800pf/.0018uf
3.6pf	39pf	240pf	2700pf/.0027uf
3.9pf	47pf	270pf	10,000pf/.01uf
4.7pf	51pf	300pf	12,000pf/.012uf
5.6pf	56pf	330pf	15,000pf/.015uf
6.8pf	68pf	360pf	18,000pf/.018uf
8.2pf	82pf	390pf	

PRICES: 1 to 10 - .99¢ 101 to 1000 .60¢ * IS A SPECIAL PRICE: 10 for $7.50
11 to 50 - .90¢ 1001 & UP .35¢ 100 for $65.00
51 to 100 - .80¢ 1000 for $350.00

WATKINS JOHNSON WJ-V907: Voltage Controlled Microwave Oscillator $110.00

Frequency range 3.6 to 4.2GHz, Power ouput, Min. 10dBm typical, 8dBm Guaranteed. Spurious output suppression Harmonic (nf_0), min. 20dB typical, In-Band Non-Harmonic, min. 60dB typical, Residual FM, pk to pk, Max. 5KHz, pushing factor, Max. 8KHz/V, Pulling figure (1.5:1 VSWR), Max. 60MHz, Tuning voltage range +1 to +15volts, Tuning current, Max. -0.1mA, modulation sensitivity range, Max. 120 to 30MHz/V, Input capacitance, Max. 100pf, Oscillator Bias +15 +-0.05 volts @ 55mA, Max.

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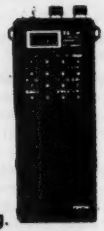

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1984 WIRE & CABLE prices cut!!! Call or write for latest listings. Certified Communications, "The CB to 10 Meter People," 4138 So. Ferris, Fremont MI 49412; (616)-924-4561. BNB073

KV4/KP2 STATION, ST. THOMAS. Contests/DX/vacations, singles/clubs. Paul Murray WA2UZA, RD 4, Princeton NJ 08540; (201)-329-6309. BNB085

EMERGENCY COMMUNICATIONS—An Organizational and Operational Handbook, by K3PUR. A complete reference guide for ARES/RACES and other public service groups, as reviewed in December '83 *QST* and January '84 *CQ*. $9.95 plus $1.50 P/H to: FDW Arts, 1394 Old Quincy Lane, Reston VA 22090 (VA residents, add 4% tax). BNB089

DX HEADING MAPS for Boston, NYC, Philadelphia, Baltimore, Detroit, Atlanta, Chicago, New Orleans, St. Louis, Dallas, LA. 11″×17″, $1.75 pp. 22″×34″, $5.95 pp. Specify city. Massey, PO Box 397, Hainesport NJ 08036; (609)-261-2952. BNB094

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REPAIR, alignment, calibration. Collins written estimates, $25; non-Collins, $50. K1MAN, (207)-495-2215. BNB117

WANTED—MACROTRONICS M-800 deluxe RTTY system for TRS-80. Bill W8QDS, 1744 Indian Woods, Traverse City MI 49684; (616)-946-3730 or 946-3042. BNB119

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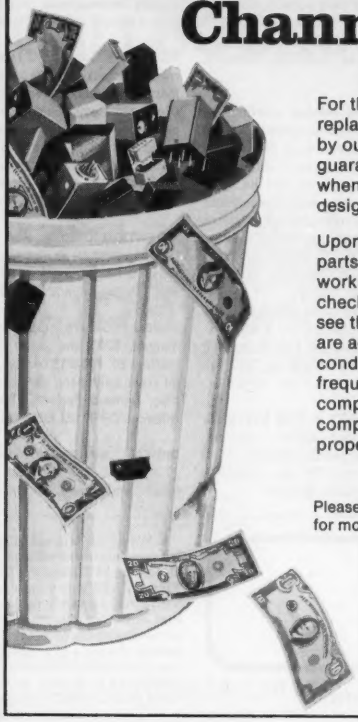

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FCC

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Reimbursement of Out-of-Pocket Costs for Volunteer Administered Amateur Radio Examinations

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: This document proposes to amend the rules to provide for reimbursement of out-of-pocket costs incurred by volunteer examiners and volunteer examiner coordinators in connection with amateur operator license examinations. Cost reimbursement is necessary for the volunteers in order for them to recover their prudently-incurred expenditures. The effect of this action is to propose rules allowing cost reimbursement.

DATES: Comments are due by April 16, 1984 and replies by May 1, 1984.

ADDRESS: Federal Communications Commission, Washington, D.C. 20554.

FOR FURTHER INFORMATION CONTACT: Maurice J. DePont, Private Radio Bureau, Washington, D.C. 20554.

List of Subjects in 47 CFR Part 97

Radio.

Notice of Proposed Rule Making

In the matter of reimbursement of out-of-pocket costs for volunteer administered amateur radio examinations; PR Docket No. 84-265, FCC 84-75.

Adopted: March 8, 1984.
Released: March 9, 1984.
By the Commission.

1. Notice of Proposed Rule Making in the above-captioned matter is hereby given.

2. The Federal Communications Commission Authorization Act of 1983 (Pub. L. 98-214; approved December 8, 1983) amended Section (4)(f)(4) of the Communications Act,[1] to provide for the reimbursement of out-of-pocket costs incurred by volunteer examiners and volunteer examiner coordinators in connection with the preparation, processing or administration of examinations for amateur station operator license. The American Radio Relay League, Inc. (ARRL) filed a Request for Agency Action on December 7, 1983, requesting that the Commission implement the legislation by amending the rules by Order as soon as possible. However, since this matter affects a large number of people (amateur licensees and applicants), we are providing for notice and comment.

3. Our proposed rules would allow both the volunteer examiner (VE) and the volunteer examiner coordinator (VEC) to be reimbursed. Each amateur radio examination, except the Novice Class,[2] is to be administered by three VE's. They may be reimbursed for the expenses they incur in administering the examination. Likewise, the VEC may be reimbursed for its preparation and processing of the examination. The total reimbursement from each examinee, however, may not exceed $4 for an examination. It could be less than that amount, depending upon the circumstances.

4. We do not propose to specify how the reimbursement fee is to be divided among the VEC's and the VE's. Both the VE's and VEC's may incur expenses. VEC's may be reimbursed for expenses that they incur in preparing and processing examinations. This could include the costs of printing, assembling and distributing the exams. In addition, a VEC may have other administrative costs since the VEC is responsible for keeping records on each examination that is given. Postage is another anticipated expense since the VEC must forward the applications of successful applicants to the Commission. There may also be costs for renting the premises where an exam is given. A VE, on the other hand, may have costs for transportation to the site of an exam and perhaps lodging expenses. Also, VE's will have postage expenses since they must forward the applications of successful applicants to the VEC. VE's may also have expenses for paper, pencils and supplies that are furnished to the applicants. We cannot anticipate every expense that a VEC or VE may incur. The statute provides that expenses may be reimbursed only if they are necessarily and prudently incurred by uncompensated volunteers. Proposed rule § 97.36 is intended to be flexible. It states that the VEC and the VE both may be reimbursed. However, they may determine how much of the reimbursement amount each will receive.

5. Present §§ 97.31 and 97.507 which relate to the VE and the VEC, respectively, provide that no compensation from any source may be accepted. We propose to amend those sections to allow for reimbursement of necessary and prudent expenses.

6. It would seem that in most cases the VE could most conveniently collect the reimbursement fee since the VE and the examinee directly interact. Candidates initially submit their applications directly to the VE's. However, in certain cases, a VEC may devise a program where the reimbursement is collected by it and then shared with the VE's to defray their out-of-pocket expenses. Varying conditions and practical necessities may affect who collects the money initially. Accordingly, we do propose to allow either the VE or the VEC to collect the fee. In the interest of flexibility, we will leave that to the VEC's and the VE's to determine.

7. The amount of reimbursement from each examinee, which may be less than the statutory $4 but may not exceed that amount, will be a reimbursement amount that is associated with *one* application. One application may result in a telegraphy exam and one or more written exam elements. All those tests will be covered under one reimbursement amount. However, once the application is acted upon by grant or by dismissal, the reimbursement amount is final. If an examinee fails an examination and later submits a new application, a new reimbursement amount may be collected.

8. As authorized by the legislation, we propose to allow the amount of reimbursement to be adjusted for inflation every January 1 as reflected in the Department of Labor Consumer Price Index. The new maximum would be stated annually in a public notice.

9. If fees are charged, both the VE and the VEC would be required to maintain records of out-of-pocket expenditures and certify annually to the Commission that all costs for which they obtained reimbursement were necessarily and prudently incurred. We would cancel the agreement that we have with a VEC if the VEC recovered more than out-of-pocket costs. Such cancellation is provided for in § 97.511 of our present rules. Section 97.33 provides that a VE will be subject to appropriate sanctions for recovery of any amount in excess of that permitted.

10. We believe that reimbursement for expenditures will make the program more attractive to volunteers and more effective. We will continue to administer some examinations in our field offices and at a few remote points in 1984 until such time as the volunteer program is in place. However, our resources for this work are very limited. We wish to implement the volunteer examination program as soon as possible for the good of the amateur community. Therefore, the comment period will be 30 days, with reply comments due 15 days thereafter. Requests to extend the time for filing comments or reply comments are discouraged and will not be routinely granted.

11. For purposes of this non-restricted notice and comment rule making proceeding, members of the public are advised the *ex parte* contact are permitted from the time the Commission adopts a Notice of Proposed Rule Making until the time a public notice is issued stating that a substantive disposition of the matter is to be considered at a forthcoming meeting or

---

[1] Section 4(f)(4) was amended by adding subparagraph (J) as follows:

"(J) With respect to the acceptance of voluntary uncompensated services for the preparation, processing or administration of examinations for amateur station operator licenses pursuant to subparagraph (A) or (B) of this paragraph, individuals, or organizations which provide or coordinate such authorized volunteer services may recover from examinees reimbursement for out-of-pocket costs. The total amount of allowable cost reimbursement per examinee shall not exceed $4, adjusted annually every January 1 for changes in the Department of Labor Consumer Price Index. Such individuals and organizations shall maintain records of out-of-pocket expenditures and shall certify annually to the Commission that all costs for which reimbursement was obtained were necessarily and prudently incurred."

[2] None of the proposed rules applies to the examination for the Novice Class license. Senator Goldwater, the sponsor of the legislation, stated, "[t]he legislation I am introducing today is not intended to have any effect upon the present novice program * * *". *Congressional Record-Senate*, S 15378; November 3, 1983.

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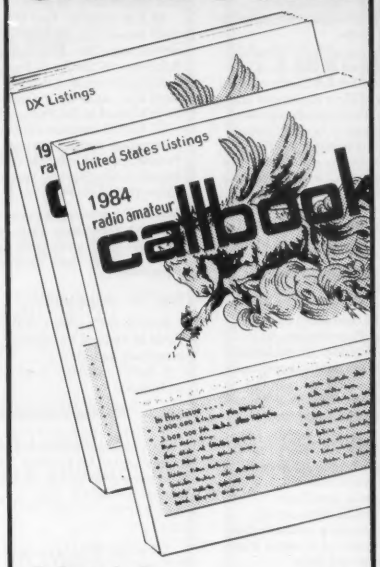

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until a Final Order disposing of the matter is adopted by the Commission, whichever is earlier. In general, an *ex parte* presentation is any written or oral communication (other than formal written comments/pleadings and formal oral arguments) between a person outside the Commission and a Commissioner or a member of the Commission's staff which addresses the merits of the proceeding. Any person who submits a written *ex parte* presentation must serve a copy of that presentation on the Commission's Secretary for inclusion in the public file. Any person who makes an oral *ex parte* presentation addressing matters not fully covered in any previously-filed written comments for the proceeding must prepare a written summary of the presentation; on the day of the oral presentation, that written summary must be served on the Commission's Secretary for inclusion in the public file, with a copy to the Commission official receiving the oral presentation. Each *ex parte* presentation must also state by docket number the proceeding to which it relates. See generally, Section 1.1231 of the Commission's Rules, 47 CFR 1.1231. A summary of the Commission's procedures governing *ex parte* contacts in informal rule makings is available from the Commission's Consumer Assistance Office, FCC, Washington, DC 20554, (202) 632–7000.

12. Authority for issuance of the Notice is contained in Sections 4(i) and 303(r) of the Communications Act of 1934, as amended, 47 U.S.C. 154(i) and 303(r). Pursuant to applicable procedures set forth in § 1.415, 47 CFR 1.415, of the Commission's Rules, interested persons may file comments on or before April 16, 1984 and reply comments on or before May 1, 1984. All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision, the Commission may take into consideration information and ideas not contained in the comments, provided that such information or a writing indicating the nature and source of such information is placed in the public file, and provided that the fact of the Commission's reliance on such information is noted in the Report and Order.

13. In accordance with § 1.419 of the Commission's Rules, 47 CFR 1.419, formal participants must file an original and five copies of their comments and other materials. Participants who wish each Commissioner to have a personal copy of their comments should file an original and eleven copies. Members of the general public who wish to express their interest by participating informally may do so by submitting one copy. All comments are given the same consideration, regardless of the number of copies submitted. Each set of comments must state on its face the proceeding to which it relates (PR Docket Number) and should be submitted to: The Secretary, Federal Communications Commission, Washington, D.C. 20554. All documents will be available for public inspection during regular business hours in the Commission's Public Reference Room at its headquarters in Washington, D.C.

14. In accordance with Section 605 of the Regulatory Flexibility Act of 1980 (5 U.S.C. 605), the Commission certifies that these rules would not, if promulgated, have a significant economic impact on a substantial number of small entities, because these entities may not use the Amateur Radio Service for commercial radio communication (see 47 CFR 97.3 (b)) and because these rules would have no foreseeable impact on manufacturers of Amateur Radio Service equipment.

15. The request for agency action filed by the ARRL is granted to the extent that it requests rules to implement the legislation which permit reimbursements of volunteers who administer or coordinate Amateur Radio examinations and is denied insofar as it requests that such rules be adopted without notice and opportunity for public comment.

16. It is ordered, That the Secretary shall cause a copy of this Notice to be served upon the Chief Counsel for Advocacy of the Small Business Administration and that the Secretary shall also cause a copy of this Notice to be published in the **Federal Register**.

17. For information concerning this proceeding, contact Maurice J. DePont, Federal Communication Commission, Private Radio Bureau, Washington, D.C. 20554, (202) 632–4964.

Federal Communication Commission.
William J. Tricarico,
Secretary.

Appendix

PART 97—[AMENDED]

Part 97 of Chapter I of Title 47 of the Code of Federal Regulations is amended, as follows:

1. Section 97.31(c) is revised to read, as follows:

§ 97.31 Volunteer examiner requirements.

* * * * *

(c) Volunteer examiners may not be compensated for services. They may be reimbursed for out-of-pocket expenses, except for Novice class examinations (see § 97.36)

* * * * *

2. Section 97.33 is revised to read, as follows:

§ 97.33 Volunteer examiner conduct.

No volunteer examiner shall give or certify any examination by fraudulent means or for monetary or other consideration. Violation of this provision may result in the revocation of the amateur radio station license and the suspension of the amateur radio operator license of the volunteer examiner. This does not preclude a volunteer examiner from accepting reimbursement for out-of-pocket expenses under § 97.36. Recovery of any amount in excess of that permitted may result in the sanctions specified herein.

3. New section 97.36 is added, as follows:

§ 97.36 Reimbursement for expenses.

(a) Each volunteer-examiner coordinator and each volunteer examiner may be reimbursed by examinees for out-of-pocket expenses incurred in preparing, processing or administering examinations for amateur station operator licenses above the Novice Class. The volunteer-examiner coordinator or the volunteer examiner must collect the reimbursement, if any, from the examinees. No reimbursement may be accepted for preparing, processing or administering Novice class examinations.

(b) The maximum amount of reimbursement is $4.00 and will be adjusted annually each January 1 for changes in the Department of Labor Consumer Price Index and announced by the Commission in a Public Notice. The amount of such reimbursement from any examinee for any examination or series of examinations related to a single application must not exceed the published maximum.

(c) A volunteer-examiner coordinator or volunteer examiner who accepts reimbursement must maintain records of the out-of-pocket expenses and reimbursements and must certify annually to the Commission's office in Gettysburg, PA 17325 that all expenses for which reimbursement was obtained were necessarily and prudently incurred.

4. Section 97.507(e) is revised to read, as follows:

§ 97.507 VEC qualifications.

* * * * *

(e) Agree not to accept any compensation from any source for its services as a VEC, except reimbursement for out-of-pocket expenses permitted by § 97.36; and

* * * * *

SATELLITES

Amateur Satellite Reference Orbits

	Date	OSCAR 8 UTC	OSCAR 8 EQX	RS-5 UTC	RS-5 EQX	RS-6 UTC	RS-6 EQX	RS-7 UTC	RS-7 EQX	RS-8 UTC	RS-8 EQX	Date
Jun	1	0052	110	0023	106	0153	135	0120	122	0010	98	1
	2	0056	111	0018	106	0138	133	0111	121	0007	99	2
	3	0100	112	0012	106	0122	130	0101	120	0004	100	3
	4	0105	113	0007	107	0107	128	0051	119	0002	101	4
	5	0109	115	0002	107	0051	126	0042	118	0159	131	5
	6	0113	116	0156	137	0036	123	0032	117	0156	132	6
	7	0118	117	0151	137	0021	121	0022	116	0153	133	7
	8	0122	118	0145	137	0005	119	0013	115	0150	134	8
	9	0126	119	0140	138	0149	146	0003	115	0147	135	9
	10	0131	120	0134	138	0133	144	0152	144	0144	135	10
	11	0135	121	0129	138	0118	142	0143	143	0142	136	11
	12	0139	122	0124	138	0102	139	0133	142	0139	137	12
	13	0001	98	0118	138	0047	137	0124	141	0136	138	13
	14	0005	99	0113	139	0032	135	0114	140	0133	139	14
	15	0009	100	0108	139	0016	132	0104	139	0130	140	15
	16	0014	101	0102	139	0001	130	0055	138	0127	140	16
	17	0018	102	0057	139	0144	157	0045	137	0125	141	17
	18	0022	103	0052	139	0129	155	0035	136	0122	142	18
	19	0027	104	0046	139	0113	153	0026	136	0119	143	19
	20	0031	105	0041	140	0058	150	0016	135	0116	144	20
	21	0035	107	0036	140	0042	148	0006	134	0113	144	21
	22	0040	108	0030	140	0027	146	0156	163	0110	145	22
	23	0044	109	0025	140	0012	143	0146	162	0108	146	23
	24	0048	110	0020	140	0155	171	0136	161	0105	147	24
	25	0053	111	0014	141	0139	169	0127	160	0102	148	25
	26	0057	112	0009	141	0124	166	0117	159	0059	149	26
	27	0101	113	0004	141	0109	164	0108	158	0056	149	27
	28	0106	114	0158	171	0053	162	0058	157	0053	150	28
	29	0110	116	0153	171	0038	159	0048	157	0051	151	29
	30	0114	117	0147	172	0022	157	0039	156	0048	152	30
Jul	1	0119	118	0142	172	0007	155	0029	155	0045	153	1
	2	0123	119	0137	172	0150	182	0019	154	0042	153	2
	3	0127	120	0131	172	0135	180	0010	153	0039	154	3
	4	0132	121	0126	172	0119	177	0000	152	0036	155	4
	5	0136	122	0120	173	0104	175	0149	181	0034	156	5
	6	0140	123	0115	173	0049	173	0140	180	0031	157	6
	7	0002	99	0110	173	0033	170	0130	179	0028	158	7
	8	0006	100	0104	173	0018	168	0120	179	0025	158	8
	9	0010	101	0059	173	0002	166	0111	178	0022	159	9
	10	0015	102	0054	173	0146	193	0101	177	0019	160	10
	11	0019	103	0048	174	0130	191	0052	176	0017	161	11
	12	0023	104	0043	174	0115	189	0042	175	0014	162	12
	13	0028	105	0038	174	0100	186	0032	174	0011	162	13
	14	0032	106	0032	174	0044	184	0023	173	0008	163	14
	15	0036	108	0027	174	0029	182	0013	172	0005	164	15

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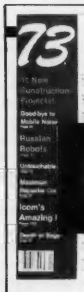

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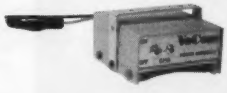

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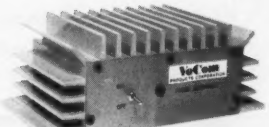

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73 INTERNATIONAL

from page 76

QSO, and I gave Gerald 5/1 and he gave me 5/2. Gerald told me that he was using a simple ¼-wave antenna just above the roof. Later on, I shut down the station and went to bed. I took two tablets of painkiller to relieve my headache.

I was supposed to call my friend in Kota Kinabalu, 9M6MH, at about 1930 local time, but by then I was feeling too cold to be active again. There was no light in the shelter. We started a fire in the fireplace, but it died very fast because there was not enough wood. I finally slept at about 2000. I was told that the temperature at Panar Laban was about 6° C and it was about 2° C at the peak.

At about 0100 the next day, everybody woke up and had some canned instant noodles and warm coffee. We started to climb to the peak, 2,500 feet higher at 13,455 feet. It had been raining during the night. Since it was still dark, I used a torch light all the way.

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The Netherlands

THE DUTCH PREFIX

In an earlier article, I told you about the different licenses in Holland: the A license for all bands and all modes, the B license for CW on some HF bands and all modes on 28 MHz and higher, the C license for all modes on 144 MHz and higher, and the D license for FM on two meters.

You can recognize a station's license class by its prefix (with some exceptions). In general, license class and prefix are as follows: A—PAØ, PA2, PA3; B—PBØ; C—PAØ, PEØ, PE1; D—PDØ; Club stations—PI4; Repeaters—PI3.

PI4NLB

This callsign is from the VERON club station in the region North-Limburg. It is on the air every Sunday morning from 1100 till 1200 UTC on 145.350, on FM, with regional news items. In the future, they will add some more frequencies.

THE DUTCH QSL BUREAU

The address of the Dutch QSL service is PO Box 330, 6800 AK Arnhem, The Netherlands. This Dutch QSL Bureau (DQB) sends all QSL cards from the members of the VERON and VRZA (the major societies in Holland) to every corner of the world. They collect the QSLs which are received at PO Box 330 and spread them among their members again. This gigantic service is free for hams and SWLs who are members of the earlier-named clubs. All the work is done by volunteers and their families in their spare time.

This year the DQB handled 1.5 million cards! I think that is a magic number!

THE HISTORY OF OM H. J. JESSE

The name Jesse may say nothing to you, but let me tell you the story of this remarkable Dutchman. We go back to the year 1923, on the winter night of December 26. Mr. Jesse was the man who made the first contact with the States. He used then the call PC11.

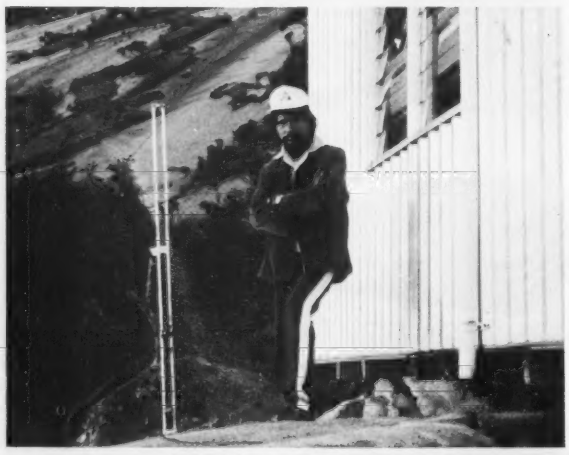
Almost every part of his transmitter was homemade, because at that time shops where you could go for radio parts were not at hand. To assemble a radio transmitter, high technical knowledge was required.

Back in the twenties, radio amateurs like Mr. Jesse had no status. He couldn't get a license, and therefore his technical achievements were illegal. After his experiments, he was prosecuted by the authorities, and when his matter came to court, everyone was so thrilled by his achievements that, although they found him guilty, they did not lay any charges on him!

Last year in December, it had been sixty years since this pioneer had his contact with the States. For this occasion, Mr. Jesse was granted a full license; his callsign is now PAØC11.

I—and many hams with me—hope that Mr. Jesse makes use of this license, because who wouldn't like to have a QSO with such a remarkable man?

On the way to Panar Laban. Left to right, Ismail, myself, Ahadiah, Teddy, and Sylvester.



At the Panar Leban shelter, about 1700 local time, with the Slim Jim at my right.

NEW ZEALAND

D. J. Chapman ZL2VR
459 Kennedy Road
Napier
New Zealand

Last month I finished the section of the column on National Field Day activities in ZL with a mention of the usual weather conditions expected at that time of the year (February). How wrong I was!

National Field Day dawned to steady rain that had been falling from the early hours of Saturday morning. The same weather was predominant throughout the whole country. The rain continued for about 12 hours, easing just before the contest began at 1500 hours ZL time. So, as you can imagine, there were many very wet and miserable FD operators in action this year. A typical FD situation was as follows:

Arrive at the site about 10 am ZL time in fairly heavy and steady rain, to commence setting up the station. The first jobs are to set up the station's shelter and locate the portable generator. No doubt all outdoor types have attempted to put up tents in the wet; quite a formidable task, especially as the wind had just begun to get up a bit. However, after much difficulty, the shelter is erected and the two tents joined together with an access passage in case the rain continues all through the FD operating period. Meanwhile, a second team has set up the motor generator a reasonable distance from the station tents, placed a canvas shelter over the outfit to keep the rain off the motor and generator, and made several attempts to get the motor running.

Eventually the motor-generator is run-up and tested, much to the relief of the FD Controller, then shut down until later when the contest is about due to start. It is still raining, and now the wind has increased considerably. It *would* be like this, for now it is time to try to get the antennas up in the trees. While the other work had been progressing, a small team had been working to get the lines into the trees for the antenna supports. These vary from site to site, but everyone tries for the highest and best-located at their site.

Imagine trying to get lines up into large trees in these conditions. Yes, you have guessed—very frustrating, and there were many, many unprintable words spoken before the job was finished. There are many different methods used here: throwing pilot lines with a casting rod, using a kite and flying the lines into place, using a crossbow, and having a volunteer "idiot" climb the tree with the lines. Nevertheless, whatever method was used, all stations completed their antenna erections in atrocious conditions, with creditable results.

At one station I have heard of, the wind was blowing so strongly that branches from the 100-foot poplars were breaking off and adding to the hazards of the wind and rain. In fact, so I'm told, one fairly hefty branch hit the FD Controller's car parked nearby and caused panel-shop repairs amounting to over $300; can you imagine what his XYL said when he got home from Field Day? Just as well the branch didn't hit any of the FD team or there would have been graver problems than one damaged car.

Once the antennas were well on the way to being erected, then a small team began organizing the station setups for the 80- and 40-meter operating positions, one in each tent. When all the cabling and antenna connections were nearly completed, the generator was again fired up, the voltage adjusted to the load, and some test calls put out to other FD stations in a similarly wet state to ours.

After all seems well, the FD Controller allows the crew to have lunch and to try to dry off a bit. The wise ones in the team have brought a change of clothes and towels to dry off with. And while the FD team is having its first break since 10 am, the weather begins to clear. By the time the first FD calls were put out, at 1500 hours, the rain had stopped and the wind decreased a bit to make conditions a little bit more pleasant than they were a few hours earlier.

For the record, this year's ZL National Field Day attracted about 50 of the 79 eligible Branches into the field, with some of the larger Branches putting in more than one team. The number of Branches operating this year was less than last year, but then, 1983 was WCY year, and no doubt there was a bit of an extra effort and emphasis placed on last year's event for that reason. Nevertheless, it was still a good turnout, considering the atrocious condi-

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tions during the setting-up period. As far as I can ascertain, only one team abandoned efforts because of the weather conditions, and this was a two-man team, so it was not too surprising.

1984 saw the first time that a full YL team operated. The "girls" were based at Inglewood in a mobile motor caravan, but even so had to contend with the wind and rain when putting up their antennas, etc. Another FD group with a difference was the station set up in a local school ground by an Auckland Branch as an amateur-radio PR exercise. The tents were erected in the middle of the school sports field, and there was suitable publicity in the local papers to encourage interested locals to visit and find out a little of what amateur radio is all about. I haven't heard how the response was, but while weather conditions on the Saturday were not good for the PR exercise, Sunday's weather was much improved.

There are always many hard luck stories from Field Day and no doubt many of these will continue to come out over the next few months, but the one I heard about was a real honey. The FD Controller had been chastising his team, urging them to try harder and make more contacts, etc., when it was time to check the motor generator for gas, etc. By now darkness had set in, so the job had to be done with a flashlight (very difficult holding a flashlight and filling the gas tank simultaneously) or by plugging in the service lamp. Well, the FD "boss" decided to plug in the service lamp. It had not been checked, and yes, you guessed right, it had a fault caused by the wet conditions; when plugged in, it upset the generator and put the station off the air. Mad panic! Get the standby generator! Attempts to start the standby failed! Then somebody decided to check the standby generator for gas. The tank was empty!

You can imagine the red face of the FD Controller. . .he has never lived that episode down and won't be allowed to forget it for many years to come. The "off-air" period was about 15 minutes at a prime time, so it was a bit embarrassing to the "boss man." Eventually, the main generator was restarted and the standby motor generator not required, but it was left gassed up just in case.

Front contenders for the FD contest honors will come from the following Branch teams: Manukau Branch ZL1QB, near Auckland; Auckland VHF Group ZL1BQ; Napier Branch ZL2ABJ; Auckland Branch ZL1AA; and Franklin Branch ZL1SA, near Pukekohe, south of Auckland.

BITS 'N' PIECES

I am including with this column a chart showing the ZL band plans, which should be of interest to amateurs worldwide. Our regulatory body, the NZ Post Office, in 1983 delegated the responsibility for planning within the amateur bands to NZART and amateurs themselves, and NZART accepted the task. The band plans are developed by the Frequency Management Working Group (FMWG) of NZART, based on IARU recommendations and local requirements, and all ZL amateurs are required to observe the published band plans "to assist others to follow their interests with a minimum impact on amateurs, and to assist amateurs to follow their interests with a minimum of impact on others."

In just over a year from now, ZL amateurs will host the IARU Region III Association Conference in Auckland from November 13–18, 1985, during IARU's Diamond Jubilee year. This will be the first time New Zealand has organized an international conference, and a fitting prelude to the NZART 60th Jubilee to be celebrated in 1986.

Silent keys of recent weeks include Bob Robertson ZL4AC, originally 4AC of Dunedin, a 60-year operator, who passed away on Christmas Eve, 1983. Also, Clem Smith ZL2DM of Gisborne, and Johnny Palmer ZL1KV of Mt. Albert, Auckland.

NEW ZEALAND BAND PLANS

These plans help you comply with the official Frequency Allocation List: "The class of emission from an amateur station shall be selected in the light of the total available bandwidth for all users and shall be in accordance with current operating practice." These plans represent current operating practice. See *Callbook* for designated frequencies and detailed band plans.

All amateurs are reminded of (1) The ITU Radio Regulations (Edition of 1982), including: 307. The bandwidths of emission shall also be such as to ensure the most efficient utilization of the spectrum; in general this requires that bandwidths be kept at the lowest value which the state of the technique and the nature of the service permit. 1804. All stations shall radiate only as much power as is necessary to ensure a satisfactory service.

(2) The New Zealand Radio Regulations 1970, including: 40. (Not to cause harmful interference to other stations). 45. (No monopoly of allocated frequencies). 147. (Permitted power limit).

(3) NZART Current Policy, Section 12A, Band Plans, (*Break-In*, page 2, October, 1983): d. All radio amateurs are requested to observe the published New Zealand band plans which are to assist others to follow their interests with minimum impact on you, and to assist you to follow your interests with minimum impact on others.

Band (MHz)	Emission (See notes)
1.8–1.95	6
3.5–3.55	N
3.55–3.9	6
7.0–7.03	N
7.03–7.3	6
10.1–10.5	N
14.0–14.1	N
14.1–14.35	6
18.068–18.11*	N
18.11–18.168*	6
21.0–21.1	N
21.1–21.45	6
24.89–24.93*	N
24.93–24.99*	6
27.12 ± 0.163	T
28.0–28.1	N
28.1–29.5	6,B,S
29.5–29.7	10
50.0–50.15	6
Amateur bands 51 to 440 MHz	30,B,R,S
Amateur bands 440 MHz to 1.3 GHz	7,B,R,S
All amateur bands above 2.3 GHz	W,B,R,S

*When available.

N = Narrow-band modes: i.e., CW and RTTY. RTTY operating is normally at the high-frequency end of the segment. *Callbook*-listed selcal (RTTY selective calling) frequencies should be avoided by stations using other modes. SSB phone may be used for Morse practice texts by stations in 3.53–3.55-MHz segment.

6 = All modes except MCW and AFSK, to a maximum bandwidth of 6 kHz.

10 = All modes except MCW and AFSK to a maximum bandwidth of 10 kHz.

30 = All modes to a maximum bandwidth of 30 kHz.

7 = All modes to a maximum bandwidth of 7 MHz.

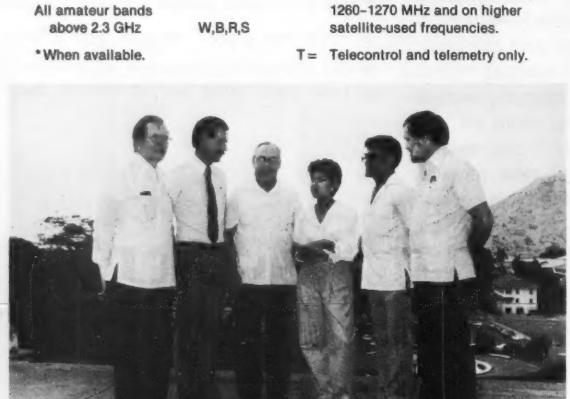
W = Wideband modes.

B = Beacons: Transmitting on *Callbook*-listed beacon frequencies should be avoided.

R = Repeaters: Transmitting on *Callbook*-listed repeater frequencies should be avoided for direct contacts in their service areas.

S = Satellites in current use: Terrestrial contacts are not recommended in the segments 29.3–29.5, 145.8–146.0, 435–438, 1260–1270 MHz and on higher satellite-used frequencies.

T = Telecontrol and telemetry only.



From left to right, James O'Donnell KB4HMO/HP1XJL, Robert Emerick W4YTM/HP1XRO, Dr. Ernst Kredel WA7ARU/HP1XEK, Ms. Nora Caballero, her father, Anival Alvarado, and Bob Rodgers HP1XRQ.

PANAMA

Robert H. Emerick
W4YTM/HP1XRO
President, Canal Zone
Amateur Radio Association
PSC Box 2029
APO Miami FL 34002

It had been 15 years since Ms. Caballero, a resident of Marshalltown, Iowa, had left the Republic of Panama as a young child. In the interim, she had lost contact with her father, still in Panama. Her ardent desire to re-establish contact with her father and to rediscover her Panamanian roots inspired Marshalltown, Iowa, amateur-radio operator Fred Meyer N0CFJ to try to help her.

One of the calls he made just happened to be picked up by James "Red" O'Donnell HP1XJL, Panama Canal Commission supervisory power dispatcher, in the home of Occupational Health Division Chief, Dr. Ernst Kredel HP1XEK. Like Fred Meyer, Jim O'Donnell could not help but get into the act.

Armed with only a name and the information that Ms. Caballero's father had been both a barber and a firefighter, Jim visited Panama's Balboa Fire Station to ask the firemen (bomberos) there if they knew of such a man. By chance, one had heard of a Sergeant Alvarado who worked at Panama's international airport. Jim was then able to locate Mr. Alvarado and establish that he was Ms. Caballero's father.

A phone patch was arranged through HP1XEK to allow father and daughter to speak, although the conversation was somewhat impeded by the fact that he spoke no English and she no Spanish. The hams were thrown into the conversation as translators.

Before long, Mr. Meyer and the fire department in Iowa were raising money to send Ms. Caballero to Panama. In Panama, a number of firefighters and ham operators were making arrangements for Ms. Caballero's arrival. These included Commission civil engineer Tomas Duque, treaty affairs specialist Robert Emerick HP1XRO, Graphic Branch equipment specialist Bob Rodgers HP1XRQ, Commission Fire Chief Jaye Dietz, and Republic of Panama bombero Capt. Christian Arnheiter. Overwhelmed by all their assistance, Ms. Caballero said, "This is simply fantastic. I had no idea so many people cared!"

Ms. Caballero's 10-day visit was characterized by a whirlwind of activities. She met with representatives from, and visited points of interest in, both Panama and the Canal area, including the Miraflores Locks and other Commission facilities. But the highlight of the trip was, of course, getting reacquainted with her father. Once again, ham radio brought

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Mini 8 ohm Speaker

Approx. 2¼" diam. Round type for radios, mike etc. **3 for $2.00**

Solid State Buzzers

small buzzer, 450 Hz, 86 dB, sound output on 5-12 vdc at 10-30 mA, TTL compatible **$1.50**

Slug Tuned Coils

Small 3/16" Hex Slugs, turned coil 3 turns. 10 for $1.00

AC Outlet

Panel Mount with Leads **4/$1.00**

CAPACITORS

TANTALUM Dipped Epoxy	ALUMINUM Electrolytic		DISK CERAMIC	
1.5 uF 25V 3/$1.00	1000 uF 16V Radial	$.50	.01 16V disk	20/$1.00
1.8 uF 25V 3/$1.00	500 uF 20V Axial	$.50	1 16V	15/$1.00
.22 uF 25V 3/$1.00	150 uF 16V Axial	5/$1.00	.001 16V	20/$1.00
	10 uF 15V Radial	10/$1.00	100 pF	20/$1.00
			.047 16V	20/$1.00

DC-DC Converter

+5 vdc input prod. -9 vdc @ 30ma
+9 vdc produces -15 vdc @ 35ma **$1.25**

Ceramic IF Filters

Mini... SOLD OUT ...7 kHz B.W. ...$1.50 ea.

25K 20 Turn Trim Pot **$1.00**
1K 20 Turn Trim Pot **$ .50**

Trimmer Caps

Sprague - 3-40 pf Stable Polypropylene **.50 ea.**

Crystal Microphone

Small 1" diameter ¼" thick crystal mike cartridge **$.75**

Mini RG-174 Coax

10 ft. for $1.00

Coax Connector

Chassis mount BNC type **$1.00**

9 Volt Battery Clips

Nice quality clips **5 for $1.00**
⅜" Rubber Grommets **10 for $1.00**

Parts Bag

Asst. of chokes, disc caps, tant. resistors, transistors, diodes, MICA caps etc. approx. bag (100 pc) **$1.00** lg. bag (300 pc) **$2.50**

Connectors

6 pin type gold contacts for mA-1003 car clock module price **.75 ea.**

Leds

- your choice, please specify
Mini Red, Jumbo Red, High Intensity Red, Illuminator Red **8/$1**
Mini Yellow, Jumbo Yellow, Jumbo Green **6/$1**

Varactors

Motorola MV 2209 30 PF Nominal cap 20-80 PF - Tunable range - **.50 each or 3/$1.00**

Crystals

3.579545 MHZ	$1.50
10.00000 MHZ	$5.00
5.248800 MHZ	$5.00

AC Adapters

Good for clocks, nicad chargers, all 110 VAC plug one end

8.5 vdc @ 20 mA	$1.00
16 vac @ 160mA	$2.50
12 vac @ 250mA	$3.00

Audio Prescaler

Make high resolution audio measurments, great for musical instrument tuning, PL tones, etc. Multiplies audio UP in frequency, selectable x10 or x100, gives .01 HZ resolution with 1 sec. gate time! High sensitivity of 25 mv, 1 meg input z and built-in filtering gives great performance. Runs on 9V battery, all CMOS.

PS-2 kit **$ 39.95**
PS-2 wired **$ 49.95**

600 MHz PRESCALER

Extend the range of your counter to 600 MHz. Works with all counters. Less than 150 mv sensitivity. specify -10 or -100

Wired, tested, PS-1B **$59.95**
Kit, PS-1B **$44.95**

30 Watt 2 mtr PWR AMP

Simple Class C power amp features 8 times power gain. 1 W in for 8 out, 2 W in for 15 out, 4W in for 30 out. Max output of 35 W, incredible value, complete with all parts, less case and T-R relay.

PA-1, 30 W pwr amp kit **$ 24.95**
TR-1, RF sensed T-R relay kit **6.95**

MRF-238 transistor as used in PA-1 8-10db gain 150 mhz **$11.95**

RF actuated relay senses RF (1W) and closes DPDT relay. For RF sensed T-R relay TR-1 Kit **$6.95**

Power Supply Kit

Complete triple regulated power supply provides variable 6 to 18 volts at 200 ma and +5 at 1 Amp. Excellent load regulation, good filtering and small size. Less transformers, requires 6.3 V ... 1 A and 24 VCT.
Complete kit, PS-3LT **$6.95**

OP-AMP Special

BI-FET LF 13741 - Direct pin for pin 741 ... but 500,000 MEG input z, super low 50 pa input curre... power drain.

50 for only $9.00 SOLD OUT **10 for $2.00**

Regulators

78MG	$1.25	7812	$1.00
79MG	$1.25	7815	$1.00
723	$.50	7905	$1.25
309K	$1.15	7912	$1.25
7805	$1.00	7915	$1.25

Shrink Tubing Nubs

Nice precut pces of shrink size 1" x ¼" shrink to ⅛". Great for splices. **50/$1.00**

Mini TO-92 Heat Sinks

Thermalloy Brand **5 for $1.00**
To-220 Heat Sinks **3 for $1.00**

Opto Isolators - 4N28 type **$.50 ea.**
Opto Reflectors - Photo diode + LED **$1.00 ea.**

Molex Pins

Molex already precut in length of 7. Perfect for 14 pin sockets. **20 strips for $1.00**

CDS Photocells

Resistance varies with light, 250 ohms to over 3 meg **3 for $1.00**

See List of Advertisers on page 114

some happiness to people at different locations in the world.

PORTUGAL

Luiz Miguel de Sousa CT4UE
PO Box 32
S. Joao do Estoril
2765 Portugal

Let me introduce you to two very interesting Portuguese awards, sponsored by REP:

(1) *DMP-WPW—Worked Portuguese World.* QSO or SWL ten different stations in ten Portuguese possessions, using any mode or band after July 29, 1947. Countries are: Portugal, Azores Islands, Madeira Island, ex-Portuguese India (not required), Cape Vert Island,* St. Tome and Principe Islands,* Angola,* Mozambique,* Portuguese Timor,* and Macau. (An asterisk means contacts made during the Portuguese administration of that country.)

(2) *DPCI—Worked Portuguese Provinces.* QSO or SWL 50 different CT stations, with 26 contacts in different provinces and islands, using any mode or band after January, 1952. Minimum QSOs with each province: Traz os Montes e Alto Douro—1, Minho—1, Douro Litoral—5, Beira Litoral—1, Beira Baixa—1, Beira Alta—1, Estremadura—10, Ribatejo—1, Alto Alentejo—1, Baixo Alentejo—1, Algarve—1, Acores—1, Madeira—1.

For these two awards, submit QSLs or list certified by an IARU-affiliated radio society and send to REP-REDE Dos Emissores Portugueses, Rua D. Pedro V, 7/4, Lisbon, Portugal, and do not forget to include 3 or 4 IRCs to cover the expenses.

As said before, the country is covered by some repeaters for VHF and UHF. A repeater's frequencies are established according to the IARU Region I band plan for VHF. So these are the repeaters, followed by their locations.

R0—CT0SE (Serra da Estrela)
R1—CT0LO (Lousa)
R2—CT0FO (Foia)
R2—CT0LE (Leiria)
R3—CT0FF (Figueira da Foz)
R3—CT0MAD (Pico Silva—Madeira)
R4—CT0MS (Monsanto—Lisbon)
R4—CT0MA (Serra do Marao)
R5—CT0SM (Cerro S. Miguel)
R5—CT0SA (Castelo Branco)
R6—CT0MO (Montejunto)
R7—CT0AR (Arrabida)
R7—CT0SL (St. Luzia—Viana do Castelo)
R8—CT0SI (Sintra)
R9—CT0ES (Estremoz)
R9—CT0VA (Valongo)

UHF

RU0—Monsanto
RU1—Serra da Estrela

In Lisbon with a hand-held, try R4, R7, R8, and RU0.

Operating Advice For Licensed Radio Amateurs, the new publication issued by the IARU, is very helpful for new hams in order to guide them in a good operation in the DX frequencies.

According to a proposal presented by GRA (Grupo de Radioamadores do Algarve), the local administration deliberated that those interested could use other prefixes during WCY/83 instead of the well-known CT that we use daily. So, during that period of time, a lot of Portuguese hams activated CQ, CR, CS, and CU.

Some of these prefixes have been in QRT since the independence of the ex-Portuguese colonies in Africa, if we all remember the old good days back in 1974/5 in Angola CR6 (CQ6, XX6), Mozambique CR7, Portuguese Guinea CR3, S. Tome and Principe Island CR5, and Cape Vert Island CR4.

It is real nice when we have other prefixes in contests.

I still remember when I went on the air using CR6UE, CQ6UE, and XX6UE in that time. We had a lot of fun. But this isn't all. We just received information from Macau CR9 saying that they would be using XX9 in the very near future.

It is a good chance to increase our WPX list.

DXPEDITION TO BERLENGA ISLAND

Four REP members, CT4UW, CT4NH, CT1AFN, and CT1CEX, were operative last March from Berlenga Island, 6 miles off the Portuguese coast at the city of Peniche, working a very special (1st World) callsign, CT0BI.

Berlenga is valid for the IOTA Award (Islands on the Air), having IOTA's number EU-40, and obviously good for WPX hunters.

The operation took place from the existing lighthouse, under Portuguese administration. Transportation and other facilities were graciously given by the Portuguese Navy. QSL cards via home calls (*Callbook* address). More about this later.

CRC—CLUBE DE RADIOAMADORES DE CASCAIS

This is a result of the efforts undertaken by a group of hams living in the municipality of Cascais. This ancient village, founded in 1400, is situated 12 miles west of Lisbon and 6 miles from Roca's Cape, where the European continent just begins.

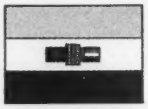
The area is surrounded by beaches, nice hotels, golf courses, souvenir shops, and, of course, the typical restaurants in which you must try the real Portuguese cuisine.

CRC is sponsoring two interesting awards for licensed amateurs as well as SWLs worldwide:

1) *100 CT Award.* For this one, contacts must be made after February 13, 1984, with 100 or more different CT stations, with at least 3 CT3 (Madeira) and CT2 (Azores) stations.

2) *CCA—Cascais County Award.* Contacts after February 13, 1984, with the six administrative divisions in Cascais County: Alcabideche, Carcavelos, Cascais, Estoril, Parede, and S. Domingos de Rana.

These two awards are issued for any band, CW or phone, as well as mixed- and single-band accomplishments. To apply, a list of contacts must be verified by two amateurs or local radio-club officials. Send a list plus 12 IRCs or US$5.00 to CRC Award Manager, PO Box 209, 2752 Cascais, Portugal.

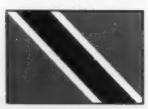


REPUBLIC OF SOUTH AFRICA

Suid-Afrikaanse Radioliga
Tak Durban Branch
Posbus 1058 PO Box
Durban 4000
Republic of South Africa

On May 31, 1984, to celebrate Republic Day in South Africa, the Durban Branch of the SARL will operate special callsign ZS5RSA. The operation will cover 3.5–28 MHz, CW and SSB, as far as band conditions permit. This is the fifth consecutive year that this activity has taken place and it has proved very popular. A special QSL card is normally issued for contacts with this station.

de Bruce P. Dunn ZS5XT



TRINIDAD AND TOBAGO

John L. Webster 9Y4JW
c/o Department of Soil Science
University of the West Indies
St. Augustine
Trinidad
West Indies

The biggest event in the WCY 1983 TTARS calendar occurred during the last week of October. This event was a national exhibition on communications in which the TTARS participated. It was a major contribution by the government of Trinidad and Tobago to World Communications Year.

The exhibition was officially opened on Sunday, October 23, by the President of the Republic and was open to members of the public daily between the hours of 10:00 am and 9:00 pm, until Saturday, October 29th. There were exhibitors from all sections of the commercial communications field, and many computers were in evidence.

The TTARS prepared an impressive exhibit in its attempt to educate the public about amateur radio. Brochures describing our hobby were prepared and distributed to all visitors to our booth. We attempted whenever possible to have three stations operating simultaneously, one on VHF simplex or the local repeater and the other two on the HF bands. Whenever we had two HF stations on simultaneously, we tried to utilize two different modes in order to demonstrate the versatility of this exciting hobby. The modes we were able to demonstrate were SSB, CW, and RTTY. Unfortunately, for much of the exhibition the propagation was poor, but about 1000 QSOs were logged using the special callsign 9Y4WCY. (Anyone wishing to confirm a QSL with 9Y4WCY should QSL to 9Y4TT.)

The antenna systems in use at 9Y4WCY consisted of two three-element triband yagis for 10, 15, and 20, a longwire for 80, and a KLM four-element yagi for 40. The latter presented quite a challenge both in finding a suitable site on which to position it and also in the actual erection of the beam. It was eventually placed, with the aid of a mobile crane, on a tripod on the top of the elevator shaft of the building housing the exhibition, at about 25 meters above ground level.

We also had all of the components of a satellite station on site with the expectation that we would be able to work OSCAR 10. Unfortunately, this was not to be, as problems developed with the equipment. When these problems were eventually sorted out, it proved impossible to hear the satellite due to the extremely high level of VHF/UHF interference being generated by the large number of computers and other communications equipment in operation on the site.

This was a great disappointment to us, but we were still able to explain amateur satellite communications to our visitors through the use of posters, brochures, and with the aid of the AMSAT AMS-81 tracking program running on the low-cost Timex TS-1000 computer.

Other exhibits included a comprehensive publications display, vintage equipment, a display showing the progression of technology from tubes to integrated circuits, an assortment of maps and posters, home-brewed equipment, and a selection of QSL cards and amateur-radio awards.

The WCY exhibition was the first real exposure to the public that amateur radio here has received. It was quite a success for the TTARS as several thousand persons visited our booth and 40 new associate members have joined the Society as a direct result of the exhibition. Most of them are now attending our current training program.

Several companies and individuals provided much of the material used to help make the show the success it was. The TTARS would like to publicly thank the following for their contributions: ARRL, RSGB, JARL, AMSAT, *CQ*, *73*, *Radio Amateur Callbook, Inc.*, Varian EIMAC, Kantronics, RCIS, Inc., Computer Applications, RCA, K0RZ and K0CY of AMSAT Software Exchange, Bob Jackson AG5X, and Jack Gutzeit W2LZX.

1983 was the year that the personal computer age really got off the ground here in Trinidad and Tobago. In the latter half of the year, many of the hams got into the act as well. As a result, the need arose for some guidance in programming in Basic for the newcomers from some of the more experienced computer hackers. This took the form of half-hour lecture/discussion sessions on the air during the weekly 9Y net, conducted by Russ 9Y4RB and Lloyd 9Y4DK. This net meets every Sunday at 1300Z on 7.159 MHz.

The final notable event in the 9Y calendar occurred with the launch of STS-9, *Columbia*, with Dr. Owen Garriott W5LFL on board. The possibility of working W5LFL stirred up considerable interest here. On Friday, December 2nd, between 2322Z and 2330Z (Orbit 70D—the only one on which Dr. Garriott was supposed to be operating that really favored Trinidad), there were at least a dozen 9Y stations keeping a racket on W5LFL's range of listening frequencies... but it was all to no avail. Not a peep was heard from *Columbia* and there were a lot of disappointed hams here in Trinidad. We are hoping for better luck next time!

HAM HELP

Am interested in modifications for a Standard C-118 2m HT, especially how to reduce the output power.

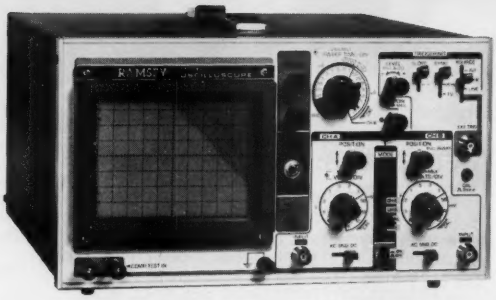
Tim Moore KL7PF
1117 "A" Street
Juneau AK 99801

I need a copy of the schematic and manual for a DuMont Mod. 274 oscilloscope. I will gladly pay copy and postage costs.

Robert A. Johnson N7CFX
833 E. Gwinn Place
Seattle WA 98102

RAMSEY

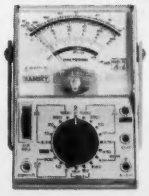
THE FIRST NAME IN ELECTRONIC TEST GEAR



NEW FROM RAMSEY–20 MHz DUAL TRACE OSCILLOSCOPE

Unsurpassed quality at an unbeatable price, the Ramsey oscilloscope compares to others costing hundreds more. Features include a component testing circuit that will allow you to easily test resistors, capacitors, digital circuits and diodes • TV video sync filter • wide bandwidth & high sensitivity • internal graticule • high quality rectangular CRT • front panel trace rotator • Z axis • high sensitivity x-y mode • very low power consumption • regulated power supply • built-in calibrator • rock solid triggering • high quality hook-on probes

$399.95 high quality hook-on probes included



RAMSEY D-1100 VOM-MULTITESTER

Compact and reliable, designed to service a wide variety of equipment. Features include • mirror back scale • double-jeweled precision moving coil • double overload protection • an ideal low cost unit for the beginner or as a spare back-up unit.

$19.95

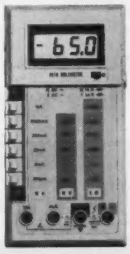
test leads and battery included

RAMSEY D-2100 DIGITAL MULTITESTER

A compact easy to use unit designed to operate like a pro. Featuring • 3½ digit LCD • low BAT. indicator • all range overload protection • overrange indication • auto-polarity • Transistor tester • dual-slope integration • vinyl carrying case

$54.95

h_{FE} test leads, battery & vinyl carrying case included



RAMSEY D-3100 DIGITAL MULTIMETER

Reliable, accurate digital measurements at an amazingly low cost • In-line color coded push buttons, speeds range selection • abs plastic tilt stand • recessed input jacks • overload protection on all ranges • 3½ digit LCD display with auto zero, auto polarity & low BAT. indicator

$59.95

test leads and battery included

CT-70 7 DIGIT 525 MHz COUNTER

Lab quality at a breakthrough price. Features • 3 frequency ranges each with pre amp • dual selectable gate times • gate activity indicator • 50mV @ 150 MHz typical sensitivity • wide frequency range • 1 ppm accuracy

$119.95

wired includes AC adapter

CT-70 kit $99.95
BP-4 nicad pack 8.95

CT-90 9 DIGIT 600 MHz COUNTER

The most versatile for less than $300. Features 3 selectable gate times • 9 digits • gate indicator • display hold • 25mV @ 150 MHz typical sensitivity • 10 MHz timebase for WWV calibration • 1 ppm accuracy

$149.95

wired includes AC adapter

CT-90 kit $129.95
OV-1 0.1 PPM oven timebase ... 59.95
BP-4 nicad pack 8.95

CT-125 9 DIGIT 1.2 GHz COUNTER

A 9 digit counter that will outperform units costing hundreds more. • gate indicator • 24mV @ 150 MHz typical sensitivity • 9 digit display • 1 ppm accuracy • display hold • dual inputs with preamps

$169.95

wired includes AC adapter

BP-4 nicad pack 8.95

CT-50 8 DIGIT 600 MHz COUNTER

A versatile lab bench counter with optional receive frequency adapter, which turns the CT-50 into a digital readout for most any receiver • 25 mV @ 150 MHz typical sensitivity • 8 digit display • 1 ppm accuracy

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wired

CT-50 kit $139.95
RA-1 receiver adapter kit 14.95

DM-700 DIGITAL MULTIMETER

Professional quality at a hobbyist price. Features include 26 different ranges and 5 functions • 3½ digit, ½ inch LED display • automatic decimal placement • automatic polarity

$119.95

wired includes AC adapter

DM-700 kit $99.95
MP-1 probe set 4.95

PS-2 AUDIO MULTIPLIER

The PS-2 is handy for high resolution audio resolution measurements, multiplies UP in frequency • great for PL tone measurements • multiplies by 10 or 100 • 0.01Hz resolution & built-in signal preamp/conditioner

$49.95

wired

PS-2 kit $39.95

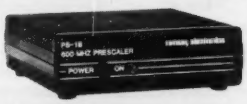
PR-2 COUNTER PREAMP

The PR-2 is ideal for measuring weak signals from 10 to 1,000 MHz • flat 25 db gain • BNC connectors • great for sniffing RF • ideal receiver/TV preamp

$44.95

wired includes AC adapter

PR-2 kit $34.95



PS-1B 600 MHz PRESCALER

Extends the range of your present counter to 600 MHz • 2 stage preamp • divide by 10 circuitry • sensitivity: 25mV @ 150 MHz • BNC connectors • drives any counter

$59.95

wired includes AC adapter

PS-1B kit $49.95

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Telescopic whip antenna—BNC plug	$ 8.95
High impedance probe, light loading	16.95
Low pass probe, audio use	16.95
Direct probe, general purpose use	13.95
Tilt bail, for CT-70, 90, 125	3.95

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TELEX 466735 RAMSEY CI

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Penfield, N.Y. 14626

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THE MOST AFFORDABLE REPEATER

ALSO HAS THE MOST IMPRESSIVE PERFORMANCE FEATURES

(AND GIVES THEM TO YOU AS STANDARD EQUIPMENT!)

JUST LOOK AT THESE PRICES!

Band	Kit	Wired/Tested
10M,6M,2M,220	$680	$880
440	$780	$980

Both kit and wired units are complete with all parts, modules, hardware, and crystals.

CALL OR WRITE FOR COMPLETE DETAILS.

Also available for remote site linking, crossband, and remote base.

FEATURES:

- SENSITIVITY SECOND TO NONE; TYPICALLY 0.15 uV ON VHF, 0.3 uV ON UHF.
- SELECTIVITY THAT CAN'T BE BEAT! BOTH 8 POLE CRYSTAL FILTER & CERAMIC FILTER FOR GREATER THAN 100 dB AT ± 12KHZ. HELICAL RESONATOR FRONT ENDS. SEE R144, R220, AND R451 SPECS IN RECEIVER AD BELOW.
- OTHER GREAT RECEIVER FEATURES: FLUTTER-PROOF SQUELCH, AFC TO COMPENSATE FOR OFF-FREQ TRANSMITTERS, SEPARATE LOCAL SPEAKER AMPLIFIER & CONTROL.
- CLEAN, EASY TUNE TRANSMITTER; UP TO 20 WATTS OUT (UP TO 50W WITH OPTIONAL PA).

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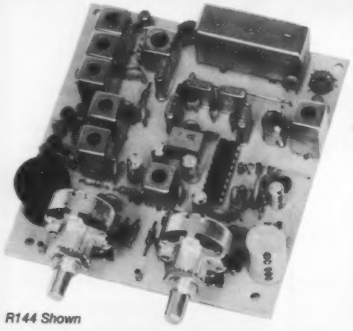
HIGH-PERFORMANCE RECEIVER MODULES



R144 Shown

- **R144/R220 FM RCVRS** for 2M or 220 MHz. 0.15uV sens.; 8 pole xtal filter & ceramic filter in i-f, helical resonator front end for exceptional selectivity, more than −100 dB at ±12 kHz, best available today. Flutter-proof squelch. AFC tracks drifting xmtrs. Xtal oven avail. Kit only $138.
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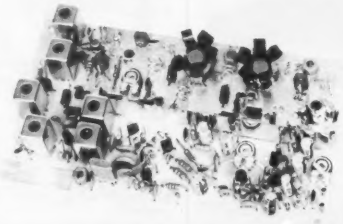
- **R76 FM RCVR** for 10M, 6M, 2M, 220, or commercial bands. As above, but w/o AFC or hel. res. Kits only $118. Also avail w/4 pole filter, only $98/kit.
- **R110 VHF AM RECEIVER** kit for VHF aircraft band or ham bands. Only $98.
- **R110-259 SPACE SHUTTLE RECEIVER,** kit only $98.

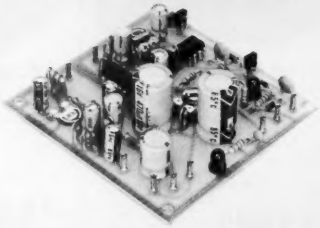
TRANSMITTERS

- **T51 VHF FM EXCITER** for 10M, 6M, 2M, 220 MHz or adjacent bands. 2 Watts continuous, up to 2½ W intermittent. $68/kit.



- **T451 UHF FM EXCITER** 2 to 3 Watts on 450 ham band or adjacent freq. Kit only $78.
- **VHF & UHF LINEAR AMPLIFIERS.** Use on either FM or SSB. Power levels from 10 to 45 Watts to go with exciters & xmtg converters. Several models. Kits from $78.
- **A16 RF TIGHT BOX** Deep drawn alum. case with tight cover and no seams. 7 x 8 x 2 inches. Designed especially for repeaters. $20.

ACCESSORIES



- **COR KITS** With Audio mixer, speaker amplifier, tail & time out timers. Kit only $38.
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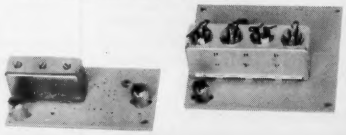
- **DTMF DECODER/CONTROLLER KITS.** Control 2 separate on/off functions with touchtones®, e.g., repeater and autopatch. Use with main or aux. receiver or with Autopatch. Only $90
- **AUTOPATCH KITS.** Provide repeater autopatch, reverse patch, phone line remote control of repeater, secondary control via repeater receiver. Many other features. Only $90. Requires DTMF Module.

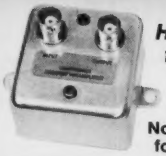


- **HELICAL RESONATOR FILTERS** available separately on pcb w/connectors.

HRF-144 for 143-150 MHz	$38
HRF-220 for 213-233 MHz	$38
HRF-432 for 420-450 MHz	$48

hamtronics® 33

NEW LOW-NOISE PREAMPS RECEIVING CONVERTERS TRANSMIT CONVERTERS



Hamtronics Breaks the Price Barrier!

*

No Need to Pay $80 to $125 for a GaAs FET Preamp.

FEATURES:

- Very Low Noise: 0.7 dB VHF, 0.8 dB UHF
- High Gain: 18 to 28 dB, Depending on Freq.
- Wide Dynamic Range for Overload Resistance
- Latest Dual-gate GaAs FET, Stable Over Wide Range of Conditions
- Rugged, Diode-protected Transistors
- Easy to Tune
- Operates on Standard 12 to 14 Vdc Supply
- Can be Tower Mounted

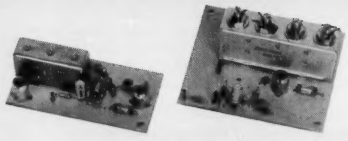
MODEL	TUNES RANGE	PRICE
LNG-28	26-30 MHz	$49
LNG-50	46-56 MHz	$49
LNG-144	137-150 MHz	$49
LNG-220	210-230 MHz	$49
LNG-432	400-470 MHz	$49
LNG-40	30-46 MHz	$64
LNG-160	150-172 MHz	$64

ECONOMY PREAMPS

Our traditional preamps, proven in years of service. Over 20,000 in use throughout the world. Tuneable over narrow range. Specify exact freq. band needed. Gain 16-20 dB. NF = 2 dB or less. VHF units available 27 to 300 MHz. UHF units available 300 to 650 MHz.

- P30K, VHF Kit less case $18
- P30W, VHF Wired/Tested $33
- P432K, UHF Kit less case $21
- P432W, UHF Wired/Tested $36

HELICAL RESONATOR PREAMPS



Our lab has developed a new line of low-noise receiver preamps with helical resonator filters built in. The combination of a low noise amplifier and the sharp selectivity of a 3 or 4 section helical resonator provides increased sensitivity while reducing intermod and cross-band interference in critical applications. See selectivity curves at right. Gain = approx.12 dB.

Model	Tuning Range	Price
HRA-144	143-150 MHz	$49
HRA-220	213-233 MHz	$49
HRA-432	420-450 MHz	$59
HRA-( )	150-174MHz	$69
HRA-( )	450-470 MHz	$79

Models to cover every practical rf & if range to listen to SSB, FM, ATV, etc. NF = 2 dB or less.

	Antenna Input Range	Receiver Output
VHF MODELS	28-32	144-148
	50-52	28-30
Kit with Case $49	50-54	144-148
Less Case $39	144-146	28-30
Wired $69	145-147	28-30
	144-144.4	27-27.4
	146-148	28-30
	144-148	50-54
	220-222	28-30
	220-224	144-148
	222-226	144-148
	220-224	50-54
	222-224	28-30
UHF MODELS	432-434	28-30
	435-437	28-30
Kit with Case $59	432-436	144-148
Less Case $49	432-436	50-54
Wired $75	439.25	61.25

SCANNER CONVERTERS Copy 72-76, 135-144, 240-270, 400-420, or 806-894 MHz bands on any scanner. Wired/tested Only $88.

SAVE A BUNDLE ON VHF FM TRANSCEIVERS!

FM-5 PC Board Kit – **ONLY $178** complete with controls, heatsink, etc. 10 Watts, 5 Channels, for 2M or 220 MHz.

Cabinet Kit, complete with speaker, knobs, connectors, hardware. Only $60.

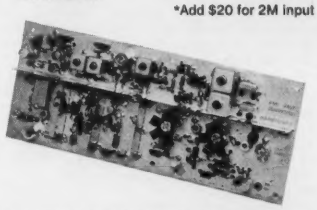
REPEAT OF A SELLOUT!

While supply lasts, get $60 cabinet kit free when you buy an FM-5 Transceiver kit. Where else can you get a complete transceiver for only $178

For SSB, CW, ATV, FM, etc. Why pay big bucks for a multi mode rig for each band? Can be linked with receive converters for transceive. 2 Watts output vhf, 1 Watt uhf.

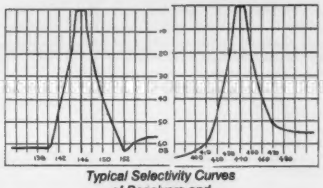
	Exciter Input Range	Antenna Output
For VHF,	28-30	144-146
Model XV2	28-29	145-146
Kit $79	28-30	50-52
Wired $149	27-27.4	144-144.4
(Specify band)	28-30	220-222*
	50-54	220-224
	144-146	50-52
	50-54	144-148
	144-146	28-30
For UHF,	28-30	432-434
Model XV4	28-30	435-437
Kit $99	50-54	432-436
Wired $169	61.25	439.25
	144-148	432-436*

*Add $20 for 2M input



VHF & UHF LINEAR AMPLIFIERS. Use with above. Power levels from 10 to 45 Watts. Several models, kits from $78.

LOOK AT THESE ATTRACTIVE CURVES!



Typical Selectivity Curves of Receivers and Helical Resonators.

IMPORTANT REASONS WHY YOU SHOULD BUY FROM THE VALUE LEADER:

1. *Largest selection of vhf and uhf kits in the world.*
2. *Exceptional quality and low prices due to large volume.*
3. *Fast delivery; most kits shipped same day.*
4. *Complete, professional instruction manuals.*
5. *Prompt factory service available and free phone consultation.*
6. *In business 21 years.*
7. *Sell more repeater modules than all other mfrs. and have for years. Can give quality features for much lower cost.*

- **Call or Write for FREE CATALOG**
- (Send $1.00 or 4 IRC's for overseas mailing)
- Order by phone or mail ● Add $3 S & H per order (Electronic answering service evenings & weekends) Use VISA, MASTERCARD, Check, or UPS COD.

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65-D MOUL RD. ● HILTON NY 14468

Phone: 716-392-9430

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✓See List of Advertisers on page 114

DEALER DIRECTORY

Culver City CA

Jun's Electronics, 3919 Sepulveda Blvd., Culver City CA 90230, 390-8003. Trades 463-1886 San Diego, 827-5732 (Reno NV).

Fontana CA

Complete lines ICOM, DenTron, Ten-Tec, Mirage, Cubic, Lunar, over 4000 electronic products for hobbyist, technician, experimenter. Also CB radio, landmobile. **Fontana Electronics, 8628 Sierra Ave., Fontana CA 92335, 822-7710.**

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New Castle DE

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Preston ID

Ross WB7BYZ has the largest stock of amateur gear in the Intermountain West and the best prices. Call me for all your ham needs. **Ross Distributing, 78 So. State, Preston ID 83263, 852-0830.**

Littleton MA

The reliable ham store serving NE. Full line of ICOM & Kenwood. Yaesu HTs, Drake, Daiwa, B&W accessories. Curtis & Trac keyers. Larsen, Hustler, Telex/Hy-Gain products. Mirage amps., Astron P.S., Alpha Delta protectors, ARRL & Kantronics instruction aids. Whistler radar detectors. Full line of coax fittings. **TEL—COM Electronic Communications, 675 Great Rd. (Rt. 119), Littleton MA 01460, 486-3400/3040.**

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See us for products like Ten-Tec, R. L. Drake, DenTron and many more. Open Monday through Saturday, 0830 to 1730. WB8VGR, WB8UXO, WD8OKN, and W8RP behind the counter. **Purchase Radio Supply, 327 E. Hoover Ave., Ann Arbor MI 48104, 668-8696.**

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Complete photovoltaic systems. Amateur radio, repeater, satellite, and computer applications! Call Paul WD8AHO. **Encon Photovoltaics, 27600 Schoolcraft Road, Livonia MI 48150, 523-1850.**

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Albany, New York
UPSTATE NEW YORK

Kenwood, ICOM, Ten-Tec, Belden, Cushcraft, Larsen, Hustler, ARRL, Hy-Gain, B&W, MFJ, Mirage. New and used equipment. Serving the amateur community since 1942. **Adirondack Electronics, Inc., 1991 Central Avenue, Albany NY 12205, 456-0203** (one mile west of Northway exit 2W).

Columbus OH

The biggest and best ham store in the Midwest featuring Kenwood and other quality products with working displays. We sell only the best. Authorized Kenwood service. **Universal Amateur Radio, Inc., 1280 Aida Dr., Reynoldsburg (Columbus) OH 43068, 866-4267.**

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IBM PC/XT kits, supplies, expansion products; video restorer kits for pay TV, CATV, satellite hobbyists' electronic project kits/appnotes. More than 9000 parts in stock: semiconductors, ICs, discretes, video accessories, tools, audio, automotive, cabinets, computer peripherals. Please write for your free 60-page catalog: **Sabet Electronics, 13650 Floyd Rd., Ste. 104, Dallas TX 75243; 783-4950 (formerly I.E.).**

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Your company name and message can contain up to 25 words for as little as $150 yearly (prepaid), or $15 per month (prepaid quarterly). No mention of mail-order business or area code permitted. Directory text and payment must reach us 60 days in advance of publication. For example, advertising for the September '84 issue must be in our hands by July 1st. Mail to 73 Magazine, Peterborough NH 03458. ATTN: Nancy Ciampa.

PROPAGATION

J. H. Nelson
4 Plymouth Dr.
Whiting NJ 08759

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	14	14	14	7	7	7	7	7A	14	14	14	14
ARGENTINA	21	14	14	14	7	7	14	14	14A	21A	21A	21
AUSTRALIA	21	14	14	7B	7B	7B	7	7	7	7B	14	14A
CANAL ZONE	14A	14	14	7	7	7	7A	14	14	14	21	21
ENGLAND	14	7A	7	7	7	7A	14	14	14A	14A	14	14
HAWAII	21	14	14	7	7	7	7	7	14	14	14	21
INDIA	14	14	7B	7B	7B	7B	14	14	14	14	14	14
JAPAN	14	14	7B	7B	7B	7	7	7	14	14	14	14
MEXICO	14	14	14	7	7	7	7	14	14	14	14A	14A
PHILIPPINES	14	14	14B	7B	7B	7B	7B	14B	14	14	14	14
PUERTO RICO	14A	14	14	7	7	7	14	14	14	14	14A	14A
SOUTH AFRICA	7B	7	7	7	7B	14	14	14	14A	14A	14	14
U. S. S. R.	14	7	7	7	7	7B	14	14	14A	14A	14	14
WEST COAST	14A	14	7	7	7	7	7	14	14	14	14	14A

CENTRAL UNITED STATES TO:

ALASKA	14	14	14	7A	7	7	7	7	14	14	14	14
ARGENTINA	21	21	14	14	7	7	14	14	21	21A	21A	21
AUSTRALIA	21	14	14	7B	7B	7B	7	7	7	7B	14	14A
CANAL ZONE	21	14	14	7	7	7	7A	14	14	14A	21	21A
ENGLAND	14	7	7	7	7	7	14	14	14	14A	14	14
HAWAII	21	14	14	7	7	7	7	7	14	14	14	21
INDIA	14	14	14	7B	7B	7B	7B	14	14	14	14	14
JAPAN	14A	14	14	7B	7B	7	7	7	14	14	14	14
MEXICO	14	14	7	7	7	7	7	7	14	14	14	14
PHILIPPINES	14A	14	14	7B	7B	7B	7B	14B	14	14	14	14
PUERTO RICO	14A	14	14	7	7	7	14	14	14	14	14A	14A
SOUTH AFRICA	7B	7	7	7	7B	7B	14	14	14A	14A	14	14
U. S. S. R.	14	7	7	7	7	7B	14B	14	14A	14A	14	14

WESTERN UNITED STATES TO:

ALASKA	14	14	14	7	7	7	7	7	14	14	14	14
ARGENTINA	21	21	14	14	7	7	7	14	21	21A	21A	21
AUSTRALIA	21A	21	14A	14	14	7A	7	7	7	7B	14	21A
CANAL ZONE	21	14	14	7	7	7	14	14	14	14	21	21A
ENGLAND	7A	7	7	7	7	7	7	14	14	14	14	14
HAWAII	21A	21	14	14	14	7	7	7	14	14	21	21
INDIA	14	14	14	14	7B	7B	7B	14	14	14	14	14
JAPAN	14A	14	14	14	14B	7	7	7	14	14	14	14A
MEXICO	14	14	14	7	7	7	7	14	14	14	14A	14A
PHILIPPINES	14A	14	14	14	14B	7B	7B	14B	14	14	14	14A
PUERTO RICO	14A	14	14	7	7	7	7	14	14	14	14A	14A
SOUTH AFRICA	7B	7	7	7	7B	7B	7B	14	14	14A	14	14
U. S. S. R.	14B	7B	7	7	7	7	7B	14B	14	14	14	14
EAST COAST	14A	14	7	7	7	7	7	14	14	14	14	14A

A = Next higher frequency band may also be useful.
B = Difficult circuit this period.

First letter = night waves. Second = day waves.
G = Good, F = Fair, P = Poor. * = Chance of solar flares.
 # = Chance of aurora.

NOTE THAT NIGHT WAVE LETTER NOW COMES FIRST.

June

SUN	MON	TUE	WED	THU	FRI	SAT
1 F/G	2 F/G	3 F/F	4 F/G	5 G/G	6 G/G	7 F/G
8 F/G	9 G/G	10 G/G	11 G/G	12 G/G	13 G/G	14 G/G
15 F/G	16 F/F	17 F/F	18 F/F	19 P/F	20 P/F	21 P/F
22 P/F	23 P/F	24 F/F	25 F/G	26 G/G	27 G/G	28 G/G
29 F/F	30 F/F					

THE NEW LOOK AT YAESU

Tired of paying too much for your Ham gear? The new generation of Yaesu high-technology equipment is designed with you in mind! New advances in computer-aided design and robotics manufacture help you save money while being assured of the best... from Yaesu!!!

FT-757GX Line
Affordable Excellence

GENERAL COVERAGE
Continuous coverage on RX from 500 kHz to 29.99 MHz in 10 Hz steps, with easy modification for MARS TX outside the Ham bands. WARC bands factory installed.

ACCESSORIES FACTORY PACKED
Electronic keyer, 600 Hz CW filter, speech processor, AM and FM units, all-mode squelch, Woodpecker noise blanker, and receiver preamp ... all included in the base price, not expensive options!

FULL PERFORMANCE
Full CW QSK, full 100 watts output at 100% duty cycle (SSB/CW/FM), and full microprocessor control with dual VFOs, eight memories with bilateral memory/VFO swap, and personal computer (CAT System) compatibility make the FT-757GX a winner, at home or away.

FT-757GX ACCESSORIES
FP-757GX Switching Power Supply, FP-757HD Heavy Duty Power Supply (for 100% duty cycle operation), FC-757AT Automatic Antenna Tuner with Memory, FAS-1-4R Remote Antenna Selector, SP-102 Speaker with Audio Filters, MD-1B8 Desk Mic, MH-1B8 Hand Mic, FIF-232C Computer Interface Module

FT-203R Line
The Compact Companion

ULTRA-COMPACT DESIGN
Chip components installed by Yaesu's assembly robots significantly reduce circuit board size, resulting in a rugged, reliable transceiver with a weight of only 450g, including the standard FNB-3 battery.

HANDS-FREE VOX
A VOX (voice-actuated transmit) unit is built-in, allowing hands-free operation when the optional YH-2 Headset is used. Ideal for tower work, public safety, or other applications where manual PTT control is inadvisable. Level control provided.

FULL FLEXIBILITY
Built-in S-meter, thumbwheel frequency programming, HI/LOW power switch, busy channel and transmit indicators are standard. DTMF Encoder versions, as well as 220 MHz and 440 MHz lines, are coming soon!

FT-203R ACCESSORIES
FTS-7 CTCSS Module, FBA-5 AA Cell Case, YH-2 Headset, MH-12 Speaker/Mic, FNB-4 High-Capacity Battery, PA-3 Mobile Adapter, MMB-21 Mobile Hanger, NC-15 Quick Charger/AC Adapter, FTT-3 DTMF Keypad

Next time you're in the market for a better rig, ask about Yaesu. Designed with care and built with pride, your Yaesu will get you through!

Prices and specifications subject to change without notice or obligation.

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YAESU CINCINNATI SERVICE CENTER 9070 Gold Park Drive, Hamilton, OH 45011 (513) 874-3100

KENWOOD

pacesetter in amateur radio

TS-930S "DX-traordinary"

TS-930S

We call it "DX-traordinary" because the TS-930S has now become the favorite rig of the serious contester! Its superior capability for full break-in split-frequency operation, the speed and convenience with which its eight memory channels can be accessed, its unsurpassed receiver dynamic range and its remarkable ability to select the desired signal during periods of heavy QRM, utilizing VBT, Slope tuning, IF Notch filtering, and tuneable audio filtering, have all combined to make this the rig that gives you the EXTRA EDGE!

The TS-930S is loaded with all the special features that you always wanted in an HF transceiver. Full coverage of the 160 through 10 meter bands, including the new WARC frequencies, (easily modified for HF MARS), plus a general coverage receiver that can tune any frequency from 150 kHz to 30 MHz. Operation in the SSB, CW, FSK, and AM modes, with selectable full or semi CW break-in. All solid-state, with 250 watts PEP input on SSB, CW, FSK, and 80 watts input on AM. SWR/power meter. Triple final protection circuits plus two cooling fans built-in. 10-Hz step synthesized frequency control. Available with optional automatic antenna tuner built-in, another industry first! Dual digital VFO's. Eight memory channels that store both frequency and band information, with internal battery back-up, (batteries not supplied). Dual mode adjustable noise blankers, especially effective in eliminating "woodpecker" type interference. SSB IF slope tuning, for maximum rejection of interference. CW variable bandwidth, with pitch and sidetone control. IF notch filter. Tuneable audio peaking filter. Unique six digit white fluorescent tube digital display is easy-on-the-eyes during those long contests. RF speech processor, for higher average "talk-power." SSB monitor circuit. 4-step RF attenuator. VOX. 100-kHz marker. AC power supply built-in, 120, 220, or 240 VAC.

TS-930S Optional Accessories: AT-930 automatic antenna tuner, SP-930 external speaker, with selectable audio filters, YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filter, YK-88A-1 (6 kHz) AM filter, all plug-in type. SO-1 commercial stability TCXO, MC-60A deluxe desk microphone, MC-80 and MC-85 communications microphones, MC-42S mobile hand microphone, TL-922A linear amplifier (not for CW QSK), SM-220 station monitor, PC-1A phone patch, SW-2000 SWR/power meter, 160~6 meter, SW100A SWR/power/volt meter 160-2m HS-4, HS-5, HS-6, and HS-7 headphones.

Isn't it about time you stepped into the winner's circle?

More information on the TS-930S is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

Specifications and prices are subject to change without notice or obligation.